

NUMBER 88

MAY 1945

THE BULLETIN

OF THE

U. S. Army Medical Department

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A periodical containing original articles, reviews, news, and abstracts of interest to the Medical Department of the Army



ISSUED UNDER THE AUSPICES OF
THE OFFICE OF THE SURGEON GENERAL

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By direction of the Secretary of War, the material contained herein is published as administrative information for the proper transaction of the public business and with the approval of the Director of the Budget.

NORMAN T. KIRK,
Major General, U. S. Army,
The Surgeon General.

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WAR DEPARTMENT,
OFFICE OF THE SURGEON GENERAL,
WASHINGTON 25, D. C.

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U. S. Army Medical Department

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Foreword

With the October 1943 issue, The Bulletin became a monthly periodical, instead of a quarterly, dedicated to keeping the personnel of the Medical Department informed on developments in war medicine. The new publication, known as The Bulletin of the U. S. Army Medical Department, absorbed the former quarterly dental and veterinary bulletins and will have material devoted to those fields in each issue.

The Bulletin is intended to be educational rather than directive in nature. It will contain the best information obtainable concerning military medical experience, observations, and procedure that may help to improve further the quality of professional services. The Bulletin will be a medium whereby experience gained in one theater of combat may be shared with those serving in other combat areas and with those in this country who are preparing for overseas duty. News items concerning military and scientific developments as well as original articles will be emphasized. The Bulletin, however, should not serve as a basis for the forwarding of requisitions for equipment or supplies referred to therein.

Obviously, some of the most interesting field experiences cannot be divulged in a periodical of this kind when our country is at war. The Bulletin will, however, publish that which can be safely told, drawing not only on current literature, but on many authoritative reports which reach The Surgeon General's Office from the field. Officers are invited to submit for publication reports of their field experiences that can profitably be shared with other officers.

The Medical Department has been commended for its work in caring for the sick and wounded in theaters of operations in war. The Bulletin will endeavor to stimulate such progress and to advance further the high standard of medical service in the Army of the United States.

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GENERAL ORDERS }
No. 29 }

WAR DEPARTMENT
Washington 25, D. C., 13 April 1945

I—The following order of the Honorable Henry L. Stimson, Secretary of War, announces to the Army the death of **FRANKLIN DELANO ROOSEVELT**, President of the United States:

"It is my duty as Secretary of War to announce to the Army the death of **FRANKLIN DELANO ROOSEVELT**, President of the United States, which occurred at Warm Springs, Georgia, at 1635 hours, 12 April 1945.

The Army is deeply grieved at the untimely death of our Commander in Chief. He prepared us to meet the savage onslaught of our enemies and he led us through the bitterness of our early reversals. His unwavering courage in the face of overwhelming odds, his abiding faith in the final triumph of democratic ideals, and his clear vision of the paths to be followed were a source of constant inspiration. He gave the Army unstintedly of his strength and wisdom and his unremitting labors hastened his death. Although he leaves us while there is still much hard fighting ahead, the ultimate victory has been fashioned of his heart and spirit.

Memorial services shall be held on the day of the funeral, 15 April, at all posts, camps, and stations, war operations permitting, at which time this order will be read.

The former Vice President of the United States, **HARRY S. TRUMAN**, has taken the oath of office and assumed the duty of President in accordance with the provisions of the Constitution."

II—The National flag will be displayed at half staff at the headquarters of all military commands and vessels under the control of the War Department from 0800 hours local time, 13 April 1945, until sunset 12 May 1945, west longitude dates, war operations permitting.

The wearing of mourning bands, the draping of colors and standards, and the firing of salutes will be dispensed with because of war conditions.

III—The body of the late Commander in Chief will be interred at Hyde Park, New York, on 15 April 1945.

BY ORDER OF THE SECRETARY OF WAR:

OFFICIAL:

J. A. ULIO

Major General

The Adjutant General

G. C. MARSHALL

Chief of Staff

News and Comment

THE TIME FOR INITIAL SURGERY IN MAJOR THORACIC INJURIES

A recent review of chest injuries by the consulting surgeon to the Fifth Army,¹ has focused attention on the optimal time for lifesaving initial surgery during the resuscitation of seriously wounded casualties. The problem arises chiefly in the management of three types of injuries: (1) thoracic wounds with continued intrathoracic bleeding, (2) thoracic wounds with large bronchopleural fistulas, and (3) thoracoabdominal wounds with continued intra-abdominal bleeding. The failure of the peripheral circulation is severe. The symptoms of "shock" are a reflection of disturbances of cardiorespiratory physiology superimposed on the oligemia of blood loss. Impending or established infection is less often a component of this problem in strictly thoracic injuries than it is in thoracoabdominal or abdominal wounds. Excessive intravenous therapy to restore blood volume invites pulmonary edema. Whole blood is the agent of choice for resuscitation. Autotransfusion is an acceptable procedure within the usual limitations of the method. Once the systolic pressure has been restored to 80 mm. Hg. or more, further transfusion therapy should be given *slowly*.

Conservative measures aimed at the correction of the disturbances of cardiorespiratory physiology are as much a part of preoperative resuscitation as blood transfusion. These conservative measures include: (1) Minimal morphine dosage, $\frac{1}{6}$ grain given intravenously, is a satisfactory dosage for the average case. (2) Needle aspiration of blood and air from the thorax—the lung should be as nearly expanded as possible. (3) Occlusive dressing of sucking wounds. (4) Decompression of tension pneumothorax by flutter valves. (5) Bronchoscopic aspiration of tracheobronchial blood and mucus. (6) Intercostal nerve block with novocaine to facilitate clearance of airways by painless coughing. (7) Oxygen therapy. (8) Minimal postural changes. The head-down position is usually advantageous. X-rays should be postponed until resuscitation is assured.

Prompt and aggressive therapy of this type avoids unnecessary surgery but will not suffice for the types of injury under discussion. It has been held by some that, once these measures have been effective in partial resuscitation, a period of further delay and rest favored "stabilization" and improved tolerance for indicated surgical procedures. This general

1. Snyder, Howard E., Lt. Col., M.C.: The Management of Intrathoracic and Thoracoabdominal Wounds in the Combat Zone, *Ann. Surg.* (in press).

principle is valid in the management of patients admitted with oligemia due to arrested hemorrhage uncomplicated by major physiologic disturbances or early infection. Recent experience^{1,2} has confirmed the wisdom of early operative correction of disturbed cardiorespiratory mechanics in the management of major thoracic wounds. Further transfusion is indicated during surgery for the replacement of operative blood loss.

During the postoperative period the patient with a thoracic injury should be kept slightly dehydrated. Impending or established pulmonary edema may warrant venesection.²

It may be concluded that disturbance of cardiorespiratory physiology contributes to peripheral circulatory failure and may require surgical treatment as part of the program for resuscitation. An important implication of this concept is the mandatory priority of a thoracic injury in the treatment of patients with multiple wounds.¹ In occasional cases, it may be helpful to allow a few hours to elapse between a lifesaving operation on the chest and the initial surgical treatment of associated injuries.²

SPECIAL HOSPITALS FOR HAND SURGERY

Patients who require extensive reconstructive surgery of the hand present a problem in plastic, orthopedic, and neurosurgery and require the attention of surgeons with special training and experience in hand surgery. While hospitals are not being designated as hand centers, the existing centers for plastic surgery are considered as appropriate hospitals for these cases, and properly qualified surgeons are being assigned to them where necessary to supplement the present staff; therefore, the more complicated hand cases should be transferred to centers for plastic surgery where reconstructive surgery of a complicated nature is to be performed.

The selection of cases for transfer, will, in doubtful cases, be left to the discretion of the commanding officer and service command surgeon. It is difficult to establish detailed rules for the transfer of these cases and, furthermore, complicating conditions such as amputations, deafness, and chest or vascular lesions may require specialized treatment of high priority. Hand disabilities due to severance of major nerve trunks, but which have not suffered direct hand trauma, are considered neurosurgical in nature and the necessary treatment will be carried out at the appropriate center. The less extensive types of hand surgery such as those involving only skin or tendon or bone and limited to one or two digits may be treated in regional and general hospitals not designated as plastic surgery centers, at the discretion of the service command surgeon.

2. Stone, Douglas, Capt., M.C.: Letter communication.

UNNECESSARY REPETITION OF DIAGNOSTIC PROCEDURES

It is important that patients transferred from overseas or from hospitals in the United States to specialized general hospitals in the United States have as part of their clinical records all material that will aid in prompt final diagnosis and treatment. This is particularly true for individuals whose diseases have been diagnosed as malignant neoplastic diseases, leukemia, filariasis, etc.

In the treatment of patients so transferred it is frequently necessary to re-evaluate previous clinical findings in the light of subsequent developments. In the absence of adequate clinical records and supporting laboratory findings, it has occasionally been necessary to repeat diagnostic procedures, including the performance of biopsies, to determine the proper therapy to be instituted. Such procedures delay necessary treatment, are wasteful of time, and are unpleasant and disconcerting to the patient. In all cases where the pathological findings bear on diagnosis and treatment, steps should be taken to ensure that patients' clinical records on transfer are accompanied by a well-prepared and stained duplicate tissue section, or the corresponding paraffin block, or a portion of "wet tissue" from the lesion, regardless of the initial diagnosis made on such material. Pertinent x-rays should also be forwarded.

PROGRESS ON THE TRENCH FOOT PROBLEM

Despite days upon days during which troops on the Italian front found themselves virtually immobile in mud, rain, sleet, and snow, during January, the Fifth Army had only 223 cases of trench foot compared with 1,490 cases during the previous January. While the improved conditions in Italy can be traced in large measure to better footgear, Fifth Army officers place greater emphasis on discipline. Unit responsibility has been adopted as a means of exterminating trench foot. Both officers and men have been instructed in preventive measures which they are now successfully applying.

For the week ending 14 January 1944, 46 percent of all casualties in the Fifth Army were the result of trench foot. During the period from November 1943 to March 1944, trench foot caused 23 percent of the casualties. However, from October 1944 to the first of February 1945, only 8 percent of all casualties could be charged to trench foot.

The total cases of trench foot suffered by infantry divisions from October 1944 to 1 February 1945 amounted to only 1.3 percent of the total infantry strength, compared with 4 percent for the same period during last season's fighting. Experiments conducted at the Italian front disclosed that footgear alone will not eliminate trench foot if the troops do not follow through with instructions passed down the line.

REFRESHER COURSES FOR A.G.F. AND A.A.F. MEDICAL OFFICERS

Refresher professional training has been approved for Medical Corps officers of the Army Ground Forces who, because of assignment to command, administrative, or semiprofessional positions, have not been engaged in the professional aspects of medical service during the last twelve months or more. The training will be voluntary, and priority for such training will be given to officers who have served overseas. Requests for this training will be submitted by eligible officers through channels to the Commanding General, Army Ground Forces, who will issue additional information on these courses.

Medical officers in the Army Air Forces are questioned at redistribution stations as to whether they wish in-service training. If they request in-service refresher courses, they are given two weeks at the School of Aviation Medicine, Randolph Field, Texas, and further clinical work in the chosen field at A.A.F. regional hospitals. (See the April *Bulletin*, page 36.)

THE EXPANSION OF GENERAL HOSPITALS

General and convalescent Army hospitals in the United States, as of 7 March, were caring for over 50,000 more sick and wounded soldiers than was the case three months ago. The number of patients had increased from around 87,000 last October to 140,000 by the end of January and it was steadily increasing. Twelve hundred casualties a day from overseas were then arriving in this country. Each of these men will be sent to an Army general hospital where there is a specialized treatment center for his type of injury or illness.

"Because of the limited number of specialists, we are making room for more patients in the general hospitals where these doctors are available," said Brigadier General Raymond W. Bliss, Assistant Surgeon General. "This also enables us to make the fullest use of other specialized hospital personnel, nurses, occupational therapists, and artificial limb makers, of whom we are extremely short."

The present expansion of general hospitals by 70,000 beds was being rapidly accomplished through the conversion of existing buildings, rather than through the construction of new wards. At many of the general hospitals, there are well-constructed barracks, which were used to house overseas hospital units during their training period. The barracks are now being turned into wards for patients. Permanent barracks, built to house the hospital staff, are also being converted into wards and these are being replaced with temporary barracks, which can be quickly constructed.

The number of bed patients who can be cared for in Army general hospitals has been further increased by the establish-

ment of more convalescent centers where patients are sent as soon as they are up and about. There are now 11 of these where soldier-patients are being reconditioned in a pleasant club-campus atmosphere for return to duty or to civilian life. This reconditioning program keeps the men active physically and mentally during convalescence. It has recently been expanded to include vocational guidance and a wider variety of technical, business, and art courses which enable the men to develop new interests and skills while they are still patients.

PATIENTS EVACUATED TO ZONE OF INTERIOR

During the first six months of 1944 the number of Army patients evacuated to the zone of the interior averaged close to 9,000 a month. Following the invasion of France the rate of evacuation rose steadily to more than 30,000 in December. The Office of The Surgeon General announced early in March 1945 that about 35,000 U. S. Army patients had been evacuated the previous month and that evacuees were arriving from overseas at a rate of about 1,200 a day. To take care of these additional sick and wounded soldiers returned from overseas, the bed capacity of the Army's general and convalescent hospital system is being increased by 70,000 beds. About 40 percent of all evacuees arriving in this country during 1944 came from the European Theater of Operations, about 25 percent from the Mediterranean Theater, 18 percent from the Southwest Pacific, and 15 percent from the Pacific Ocean Area. During the last quarter of the year the European Theater of Operations accounted for more than half of all evacuees. These figures reflect the varying proportions of battle casualties in the different theaters, differences in health conditions, and different evacuation policies, as well as the fact that the patients arriving in the United States represent the sick and wounded who were hospitalized in overseas theaters on the average two to three months earlier.

Nearly one-fifth of the evacuees reached this country in 1944 by plane. Evacuations by plane attained a peak during the third quarter of the year and declined slightly in the last three months of the year, chiefly because of adverse weather conditions over the North Atlantic at that season. In the Pacific Theater, evacuation by air has been steadily increasing in importance, with about 20 percent of the evacuees from the Southwest Pacific and nearly one-third of the evacuees from the Pacific Ocean Area arriving by air during the last quarter of 1944.

During the first half of 1944, battle casualties comprised 12 to 15 percent of the evacuees arriving in this country. The stepping up of offensive operations beginning with the invasion of France was reflected in a rising proportion of battle casualties which averaged about 35 percent of all evacuees in

the second half of the year. The proportion of battle casualties to total evacuees is likely to continue to increase for some time yet and in this connection it may be noted that during the last three months of 1944 almost 60 percent of all evacuees from the European Theater of Operations were battle casualties. A higher proportion of battle casualties among the evacuees to the zone of the interior calls for a larger number of general and convalescent hospital beds than would be otherwise required, because the length of hospitalization of battle casualties is considerably greater than that of medical cases. For the year as a whole, about 40 percent of the evacuees from both the European and Mediterranean Theaters of Operations were battle casualties, as contrasted with 6 percent for the Southwest Pacific and 11 percent for the Pacific Ocean Area. Nonbattle injuries represented more than 10 percent of the evacuees arriving in this country during 1944, with the highest proportion from the Mediterranean Theater (15 percent). It is also noteworthy that five out of every six evacuees from the Pacific Theaters during 1944 were for disease.

About 40 percent of all patients evacuated in 1944 on account of disease suffered from psychiatric disorders. This proportion was fairly representative of the more important overseas theaters but tended to decrease with growing experience in handling psychiatric casualties. About half of the psychiatric cases evacuated were diagnosed as psychoneuroses and nearly one-third, as psychotic. The proportion of psychoses evacuated was unusually high in the Southwest Pacific Theater. Skin conditions accounted for almost 7 percent of all disease cases evacuated; 70 percent of them came from the Southwest Pacific Theater, in which theater they represented a fifth of all patients evacuated for disease. Diseases of the musculoskeletal system, allergies and allied conditions, and gastric and duodenal ulcers each accounted for somewhat over 5 percent of all disease cases evacuated. The Pacific Theaters had a higher proportion of allergy cases while the European and Mediterranean Theaters had a higher proportion of gastric and duodenal ulcer cases. Evacuees with arthritis comprised slightly less than 5 percent of all disease cases evacuated, while malaria (with complications), diseases of the ear and mastoid process, and tuberculosis each accounted for about 2 percent of the disease patients evacuated. The Pacific Ocean Area had a significantly higher proportion of malaria cases evacuated, while the corresponding proportion for the Southwest Pacific Theater was notably low. Evacuees with tuberculosis comprised a lower than average proportion of all disease cases evacuated in the Pacific Theaters.

An analysis of the traumatism cases evacuated during 1944 indicates that the two largest categories were wounds and compound fractures, each accounting for about 30 percent of the total; during the last quarter of the year, which

more nearly reflected the full weight of battle casualties, wounds increased to 35 percent and compound fractures to 45 percent of all traumatism cases evacuated. For the year as a whole, simple fractures represented about 10 percent and loss of part of the body 5 percent of the traumatism cases evacuated. Burns and effects of cold (chiefly trench foot) each accounted for slightly more than 1 percent. Traumatism cases evacuated were distributed as follows by region of body affected: lower extremities, 45 percent; upper extremities, 27 percent; head, face, and neck, 12.5 percent; abdomen, 5 percent; thorax, 5 percent; and others, 5.5 percent.

THE NURSE RECRUITING PROGRAM

Methods of recruitment of nurses have been simplified and accelerated so that qualified nurses now are appointed quickly and ordered to duty. Nurses are classified by the Procurement and Assignment Service as either available for military duty or essential to the needs of civilian communities. A large number of such classified nurses are available for military duty. Through the combined efforts of a recruiting representative of the Army Nurse Corps, organized professional nursing groups, the Procurement and Assignment Service, and the American Red Cross, impetus has been given the current recruitment program. The urgent call of the President of the United States, who pointed out the critical needs of the Army for more nurses, was followed by a favorable response in voluntary recruitment, but the number commissioned is still far less than the number required.

The appointment of nurses, which is almost entirely in the hands of the service commands, has been facilitated by the appointment of an enlarged staff of the chief nurse of each service command. A final type physical examination is given each applicant. All credentials and other papers are carefully reviewed, and acceptable candidates are immediately tendered an appointment in the Army Nurse Corps. On acceptance, the nurse is ordered to duty at the time she has specified as her earliest date for availability for military service. In certain instances nurses have gone to duty within ten days of appointment.

Recently appointed nurses are ordered to duty at one of the special basic training centers in each service command. A four weeks' course of training in military customs and courtesies, Articles of War, defense against chemical warfare, hospital research and administration, tropical medicine, military nursing, and other subjects is given each trainee. Nurses are also given calisthenics and close order drill to gradually condition them to the rigors of camp life. The same course of training is given recently appointed hospital dietitians and physical therapists.

Medical Department personnel in active theaters have

From the Personnel Service, Surgeon General's Office.

repeatedly, individually, and collectively pointed out the acute need for additional nurses in Army hospitals. They have done much to clarify a situation clouded by lack of understanding of the over-all needs of the Army. Medical officers, nurses, and medical soldiers can still further assist personally by correcting any lingering doubt in the minds of prospective applicants for appointment as officers in the Army and duty with the Army Nurse Corps.

THE ARMY NEEDS NURSES IMMEDIATELY

Major General George F. Lull, the Deputy Surgeon General, announced on 21 February that the Army needed 16,000 additional nurses immediately in order to care adequately for wounded and sick American soldiers. During the first two weeks of February, 1,450 registered nurses received commissions in the Army Nurse Corps, an increase over the 1,050 commissioned during January. The February addition brings the total for the Corps up to 44,000. The authorized ceiling was raised recently to 60,000. About 250 nurses are separated from the Army each month for various reasons.

"While the February figures are encouraging, they are far from the quota essential for the proper care of our wounded soldiers. At that rate of increase it will take many months to get sufficient nurses, and our need is immediate. I would urge all those active in the procurement campaign for Army nurses to redouble their efforts," General Lull said.

Of the 44,000 Army nurses, about 71 percent are overseas, some having been in foreign theaters for several years. When adequate numbers are available, it will be possible to make more effective a rotation plan that will provide much needed change for the overworked nurses who have been away from home for long periods.

FIVE NURSES DECORATED, ONE COMMENDED

Five members of the Army Nurse Corps have been decorated and one awarded a commendation, the War Department announced on 11 March.

Major Louise M. Fitzgerald, Jacksonville, Florida, was awarded the Legion of Merit for exceptionally meritorious conduct in the performance of outstanding service as chief of the Nurse Section, Headquarters, Persian Gulf Command, from 15 July 1943 to 26 May 1944.

First Lieut. Retha O. Rodgers of Hubbard, Iowa, and First Lieut. Josephine F. Sansone of Milwaukee, Wisconsin, were awarded the Air Medal for services rendered while acting as flight nurses from 21 February 1943 to 23 July 1944 on unarmed and unarmored troop carrier aircraft on air evacuation missions in the Mediterranean and European Theaters.

Second Lieut. Bernice V. McDonald, Burk Burnett, Texas, as flight nurse from 19 February 1944 to 31 July 1944 with the Army Air Forces was awarded the Air Medal 25 September 1944, for meritorious achievement while participating in more than 150 hours of operational flight in transport aircraft through the combat zones of Upper Assam, Burma, and Southwest China.

Second Lieut. Ruth C. Bimber, Beaver Falls, Pennsylvania, was awarded the Soldier's Medal for heroism 11 July 1944. While swimming with a party of officers from her unit, two officers were caught in a treacherous undertow. Lieutenant Bimber went to the help of one officer and held his head out of water until another officer came to her assistance.

First Lieut. Ledore G. Alsup, Fort Worth, Texas, was awarded a commendation for courageous actions on 29 March 1944, near Anzio, Italy, when she was responsible for the safety of her patients while removing them to safer positions.

CAMP BARKELEY CLOSED

The Army Service Forces Training Center, Camp Barkeley, Texas, representing the largest installation of its kind in the history of military medicine, was closed on 1 April, after about 130,000 enlisted men had been trained there as Medical Department soldiers. Of this number, more than 9,000 were trained as chauffeurs, nearly 7,000 as cooks and bakers, 1,500 as sanitary technicians, and over 10,000 as clerks. Brigadier General Roy C. Heflebower, who had been in command since its activation as a Medical Replacement training center on 1 November 1941, now commands the U. S. Army General Hospital, Camp Butner, North Carolina. More than half of the Medical Administrative Corps officers on active duty were trained at the officer candidate school at Camp Barkeley. The school was inactivated 15 March 1945 on the graduation of its fortieth and last class. The training of officer candidates for Medical Administrative Corps is being continued at the Medical Field Service School, Carlisle Barracks, Pennsylvania.

A great number of Army Service Forces medical units were instructed and prepared at Camp Barkeley for overseas duty. Included among these were general, field, and station hospitals, hospital ship complements and platoons, and many smaller units.

Certain medical training battalions and administrative personnel from Camp Barkeley have been moved to Camp Crowder, Missouri, where the medical section of that Army Service Forces training center was activated on 7 March 1945, under the command of Colonel Frank S. Matlack, M. C., former executive officer of Camp Barkeley.

THE SEROLOGIC DIAGNOSIS OF RICKETTSIAL DISEASE

The serologic diagnosis of rickettsial diseases is based on demonstrating a rise in antibody titer. For this reason it is important to examine a specimen of serum early in the disease and additional specimens frequently thereafter. Specimens from suspected cases of Rocky Mountain spotted fever and endemic typhus fever should be obtained in the first week of illness, at least once a week during the course of the disease and early convalescence, and again five weeks and two months after the temperature returns to normal. Enough blood should be drawn to yield 5 to 10 cc. of serum. After clotting, the serum should be removed under sterile precautions from the clot and shipped in a sterile Wassermann tube, properly corked. No preservative should be added. Serum specimens from all cases in the United States should be sent to the Division of Virus and Rickettsial Diseases, Army Medical School.

ANXIETY ABOUT SEROLOGIC TESTS FOR SYPHILIS

Instances have occurred in which premature communication of results of serologic tests for syphilis to patients with clinical malaria, or to their families, has been a source of great worry and serious difficulties in personal relations. It is well known that results of such tests, when not supported by evidence in the clinical history or examination, must be interpreted with caution. The possibility of both technical and biologic false positive tests should be constantly borne in mind. Doubtful and false positive tests for syphilis may occur in a number of diseases, some of which are common in the Army. Among the many diseases in connection with which this problem is important may be mentioned malaria, infectious mononucleosis, and infectious hepatitis. Because of the large number of individuals in the Army who have malaria, this disease in particular is a frequent source of confusion. Doubtful and false positive tests in association with malaria usually occur when the disease is manifested by clinical or parasitemic activity. Tests are usually found to be only weakly positive when quantitative results are available. Doubtful and positive results due to malaria and other acute diseases are generally transient. Nevertheless, the resolution of the problem they create may be very difficult.^{1 2 3 4} The welfare and interests of patients should be carefully guarded. Treatment for syphilis should not be instituted without a thorough study of the case. If necessary, the patient should be given a simple, but thoughtful explanation of the situation. Great care should be exercised in the communication of the results of tests to others.

1. Davis, Bernard D.: Biologic False Positive Serologic Test for Syphilis, *Medicine*, 23:359, Dec. 1944.

2. Rein, Charles R., and Callender, George R.: Verification Tests in Sero-diagnosis of Syphilis, *Bull. U. S. Army M. Dept.*, 85:108, Feb. 1945.

3. Rosenberg, Arthur A.: Effect of Malaria on Serologic Tests for Syphilis, *Bull. U. S. Army M. Dept.*, 84:74, Jan. 1945.

4. False Positive Serologic Reactions Due to Nonsyphilitic Diseases, S.G.O. Circular Letter No. 93, 30 April 1943.

EXPERIMENTS ON IMMUNITY IN SCRUB TYPHUS

Evidence is accumulating that in the experimental animal at least, an active immunity follows infection with scrub typhus. Captain E. J. Bell, Sn.C., and Colonel Harry Plotz, M.C., of the Division of Virus and Rickettsial Diseases, Army Medical School, Washington, D. C., have reported, to the director of the U.S.A. Typhus Commission, experiments that fit in with observations made by other investigators, as well as their own—namely, that an active immunity against scrub typhus in the experimental animal can be induced. When rabbits, guinea pigs, and hamsters were inoculated intracutaneously with small doses of infectious peritoneal exudate, an indurated papular lesion developed which lasted a few days and then regressed to disappear completely. They have no evidence on the possible distribution of the agent following the intracutaneous inoculation. When these animals were challenged by the inoculation of infectious material, they were shown to possess a solid immunity, while the controls showed signs of active disease or died.

KAHN TEST READING LIGHT

The speed, accuracy, and consistency of Kahn test readings depend to a considerable degree on the use of suitable and constant lighting conditions. Major Edgar S. Ingraham, M.C., reports that an item of issue can be used satisfactorily for this purpose. The substage mirror of a standard microscope has long been used to obtain a low degree of magnification in reading the Kahn test. It is used by viewing the suspension in each tube of the test as it is reflected in the concave side of the mirror. For best results this requires an even incident light and a black background. Both of these requirements are met by the Box, viewing, for dental films, Item No. 5027500 in the Medical Supply Catalog. The lens of this box is taken from its sliding holder and removed to a safe place, the holder is pushed to the left end of its slide, and the lamp box is rotated forward as far as possible, to form an acute angle between the ground glass and the table top. The substage mirror is put just below the overhanging aperture in the view box and adjusted so the black hood between the ground glass and the



U. S. Army Signal Corps photograph.

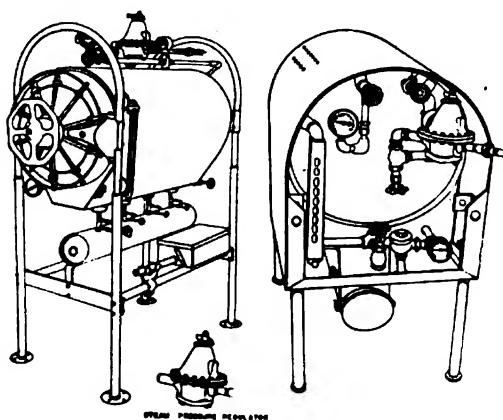
edge of the aperture is reflected to the observer's eye. Tubes held above the mirror are now seen in a uniform incident light which is not visible to the observer, and the mirror reflects them against the black background of the hood. These lighting conditions are reproducible at any time with absolute uniformity and are nearly ideal for reading the Kahn test. While the black portion of the hood is narrow, it is sufficient to fill the mirror and form an adequate background. A somewhat broader field is provided if the brass slide rail of the box is blackened in a benzene flame. This device has been in constant use for over a year and has been readily and enthusiastically accepted by the individuals who have used it.

DRESSING AND UTENSIL STERILIZER (ITEM NO. 9950000)

The dressing and utensil sterilizer is designed for field use, and, since steam or electricity is not always available, it is made to operate by gasoline firing. This necessitates the maintenance of adequate ventilation to avoid harmful effects from gasoline fumes, especially if leaded gasoline is used. When a source of direct steam is available for the operation of the sterilizer and it is desired to operate the sterilizer in an inclosure, it is advantageous from an operational and maintenance standpoint to use

the direct steam in lieu of gasoline firing. This may be done by removing the funnel from the water inlet line, draining the water from the jacket, and admitting the steam to the jacket through the water inlet line.

The sterilizer may receive steam from any source, provided not less than 17 pounds of pressure are available. Frequently such items as the Boiler, steam portable (Med.



Dept. Item No. 9910000) and Disinfector, trailer type (Item No. 7791000, old number; 9924650, new number), may be used as a source of steam. When the steam supplied is greater than 17 pounds' pressure, a steam pressure reducing regulator must be used. The pressure regulator is mounted in the line between the steam source and the water inlet valve as shown on the sketch. If the Disinfector, trailer type, is used as a source of steam, the 90-degree elbow on the chamber pressure gage of the disinfector should be removed and a "Tee" substituted. Connection would be made to the "Tee." Pressure to the sterilizer may be controlled by the chamber pressure gage for the disinfector; this eliminates the need for the pressure regulator.

ACUTE ARSENIC POISONING

Several inorganic arsenic compounds are now used in the Army program of sanitation and preventive medicine. Paris green (copper acetoarsenite) is still employed as a dusting powder on water surfaces to kill mosquito larvae, although DDT is replacing it for this purpose. Arsenic trioxide is a frequent ingredient of commercial rat poisons which are sometimes obtained by local purchase. Sodium arsenite is being used in the form of a spray for the control of maggots in fly-breeding areas, particularly for the prevention of fly breeding in dead bodies. The danger of poisoning from this compound is particularly great since it is used as a spray. For this reason, care should be taken that the spray connections are tight, that concentrated solutions of the compound do not come into contact with the body, and that the spray is not directed against the wind. The powder should be stored well away from ration supplies. Rubber gloves should be worn in mixing the solution, and any of the solution which is spilled on the body should be washed off immediately. The continued use of sodium arsenite in treating fly-breeding areas is dangerous, since it may result in contamination of ground water. It should, therefore, be used only as an emergency measure, and water supplies in the area should be analyzed to make sure that contamination has not occurred.

Cases of arsenic poisoning may result from the careless use of these compounds or from suicidal attempts.

Following the ingestion of arsenic, the time of onset of symptoms varies with the rate of absorption. If arsenic is ingested with a meal, symptoms may be delayed for as long as twelve hours. Usually, however, the symptoms are apparent within one hour. Constriction of the throat and difficulty in swallowing may be the first symptoms to appear. Excruciating gastric pain which is aggravated by pressure soon follows. Persistent and projectile vomiting is characteristic. The vomitus may at first consist of a "rice water" fluid, but later it becomes mucoid, bile-tinged, and bloody. Diarrhea progresses from ordinary fluid evacuations to the passage of "rice water" stools and ultimately to bloody discharge. The urine is scanty, albuminous, bloody, and eventually may be completely suppressed. The patient often complains of marked skeletal muscle cramps. A severe thirst due to fluid loss is characteristic and poisoned individuals may drink large amounts of water. The muscle cramps are presumably caused by the distortion in the electrolyte pattern and distribution of body fluids as a result of the loss of fluid and electrolytes from the intestinal tract. As the loss of fluid from the intestinal tract and capillary beds proceeds, symptoms of shock appear. The skin becomes cold, damp, and pale, the pulse rapid and weak, the

From the Medical Division, Chemical Warfare Service, and the Medical Consultants Division, Surgeon General's Office.

blood pressure very low, and the respiration depressed. Coma and death may result. A terminal anoxia may initiate convulsions. In severe poisoning, death can occur within an hour, but the usual fatal period is twenty-four hours.

In some cases, after acute symptoms subside, a chronic peripheral neuritis or chronic gastroenteritis may occur.

Treatment

The symptoms of arsenic poisoning are often delayed until considerable absorption of the poison has occurred; nevertheless, copious gastric lavage by stomach tube with warm water or milk should be given if the poison was taken orally. This procedure is probably as effective as more elaborate chemical antidotes which may not be readily available. Fluid loss from vomiting and diarrhea is prominent and all efforts should be directed as soon as possible toward restoring the fluid and electrolyte balance. This is readily accomplished by the intravenous administration of isotonic solution of sodium chloride. Large amounts of intravenous sodium chloride are frequently required. Morphine is of great value in controlling pain.

In addition to the above symptomatic treatment, BAL is a specific antidote for systemic arsenic poisoning. Once the diagnosis of arsenic poisoning has been made, BAL should be administered whether poisoning is in an early or an advanced stage. An immediate intramuscular injection of 10 percent BAL in oil (Med. Dept. Item No. 1088500) should be given deep into the muscles of the buttocks. Particular care should be exercised to avoid injecting the solution into a blood vessel. Dosage must be adjusted to the weight of the patient, as follows: 125 pounds, 2.5 cc.; 150 pounds, 3.0 cc.; 175 pounds, 3.5 cc.; and 200 pounds, 4.0 cc. The intramuscular injection of 10 percent BAL in oil should be repeated at different sites in the same general area at four, eight, and twelve hours after the initial injection, making a total of four intramuscular injections of equal dosage. If the symptoms of arsenic poisoning are advanced and severe, the interval between the first and second doses should be shortened to two hours. In such cases, the course of therapy should be extended to include single, daily, intramuscular half-doses for three or four days.

Reactions Caused by BAL in Oil

The signs and symptoms may include a feeling of constriction in the throat, a sense of oppression in the chest, a burning sensation of the lips, mild lacrimation, slight reddening of the eyes, dryness of the mouth, tenderness and increased muscle tonus at the site of injection, mild restlessness and nervousness accompanied by sweating of the hands, apprehension on the part of some patients, and mild nausea and vomiting, on eating, in a few. There may be transient rise in blood pressure. Slight tenderness at the site of injection may persist for several days. All reactions are generally transient, beginning fifteen

to thirty minutes after injection and lasting about thirty minutes. Elevation of blood pressure or other reactions, unless unduly severe and prolonged, do not contraindicate the continued administration of the full course of four injections of the drug.

MAJOR GENERAL KENNER

Major General Albert W. Kenner, surgeon at Supreme Headquarters, Allied Expeditionary Forces (SHAEF), visited the homeland on a brief leave in February. General Kenner entered the Army in 1916 as a lieutenant in the Medical Reserve Corps. During World War I, he participated in every engagement of the 1st Division. He has been an instructor at West Point and has served at the Walter Reed General Hospital, the Medical Field Service School, as chief of surgical service at Fort Banks Massachusetts, as chief of medical service at the Sternberg General Hospital in Manila, as post surgeon at Fort Myer, and with the Headquarters, Armored Force, at Fort Knox, Kentucky. General Kenner, then colonel, organized the medical service for the invasion of North Africa. He was promoted to brigadier general on 1 December 1942 and to major general on 23 September 1943. He holds the Distinguished Service Cross, Silver Star with two Oak-Leaf Clusters, Purple Heart, and Distinguished Service Medal and has also been awarded the Legion of Honor, Degree of Knights (French Government) and the Grand Officer of Ouissam Alaouite (French Morocco).



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DENTAL TREATMENT AT VETERANS' FACILITIES

The Veterans' Administration recently has had an increase in requests for dental treatment by veterans of this war, and such requests will continue to increase. Under existing laws and policies, the dental service of Veterans' facilities can render outpatient treatment for those having service-connected disabilities. This means, in effect, that if an individual, while in the service, had a tooth removed which was not marked for extraction at the time of induction, the veteran will be eligible for a tooth replacement. One can visualize many potentialities for dental service, even under present legislative limitations, and one further must realize how *very important the examination at the induction station was, and is, at this time*. In other words, the major criterion for determining service-connection is the dental examination at the induction station.

Subsequent to the dental examination at the induction station a dental survey is made of all inductees. The survey is not a detailed examination, but a rapid screening to determine which men require immediate dental attention, which men will need treatment in the near future, and which are in an acceptable state of dental health. All inductees who visit or who are treated at any Army dental installation will receive a detailed examination, and this record as well as all future examination records will be filed for the use of the Veterans' Administration after the man's discharge; furthermore, a detailed dental examination will be made at the termination of the man's service in the Army. The dental findings subsequent to induction, which are not listed on the original induction examination, will in the majority of instances imply service-connection.

The veteran of this war, if he desires to receive dental treatment, makes application for a dental examination at the nearest Veterans' Administration regional office, and there, with the aid of the man's records, it will be determined if he is entitled to such service. The extent to which the Veterans' Administration will participate in the future dental problems of the veterans of this war is not fully determined. That the facilities of the Veterans' Administration, under given conditions, are now available to the veteran is definite. The magnitude of the veterans' dental needs and what demands will be placed upon this agency are still in the realm of conjecture.

GETZ ACRYLIC DENTURE BASE LINER

Recent tests of Medical Department Item No. 5207300, Denture base material, acrylic, pink, permanent liner, in tube (manufactured by Getz), at the Walter Reed General Hospital indicate that if the directions are followed in the use of this material it is acceptable. It is believed that the burning of the

From the Dental Division, Surgeon General's Office.

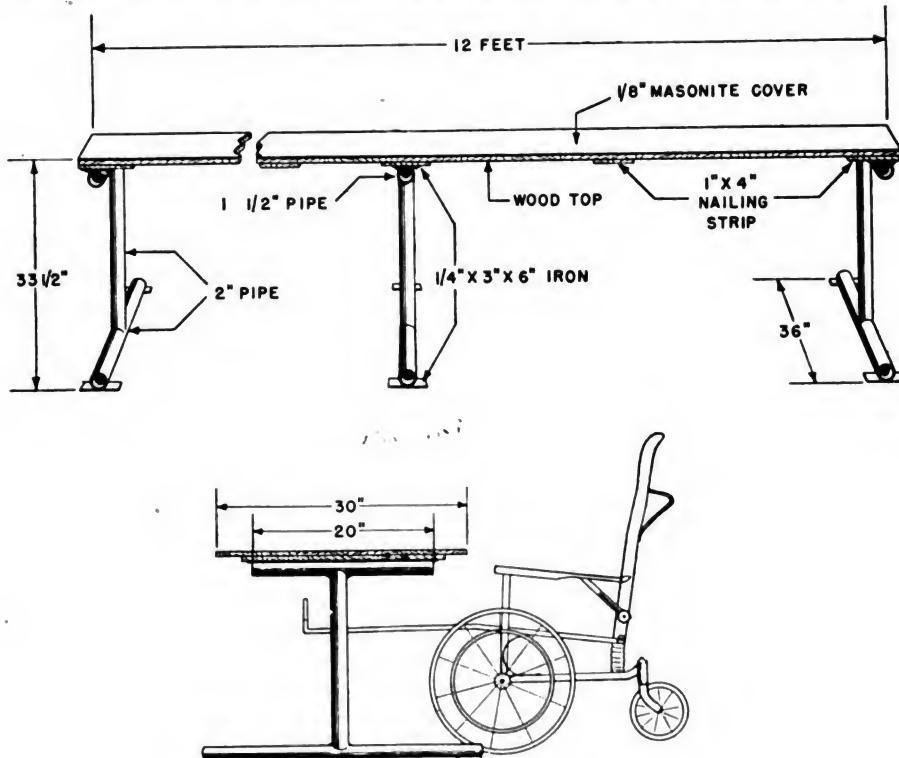
oral tissues is the result of inserting the denture immediately after the relining material has been added. The newly relined denture should not be inserted in the mouth until the solvent in the reliner has evaporated. It is estimated that at least a thirty-minute waiting period will be required to permit the solvent to evaporate.

TABLE AND BOARD FOR USE WITH WHEEL CHAIR

A special table at which patients confined to wheel chairs can be served meals has been developed by Master Sergeant Gerald H. Prewett at McCloskey General Hospital. The advantages of serving wheel-chair patients in the hospital general mess hall are obvious, and much labor involved in food dis-



Patients seated comfortably in wheel chairs.

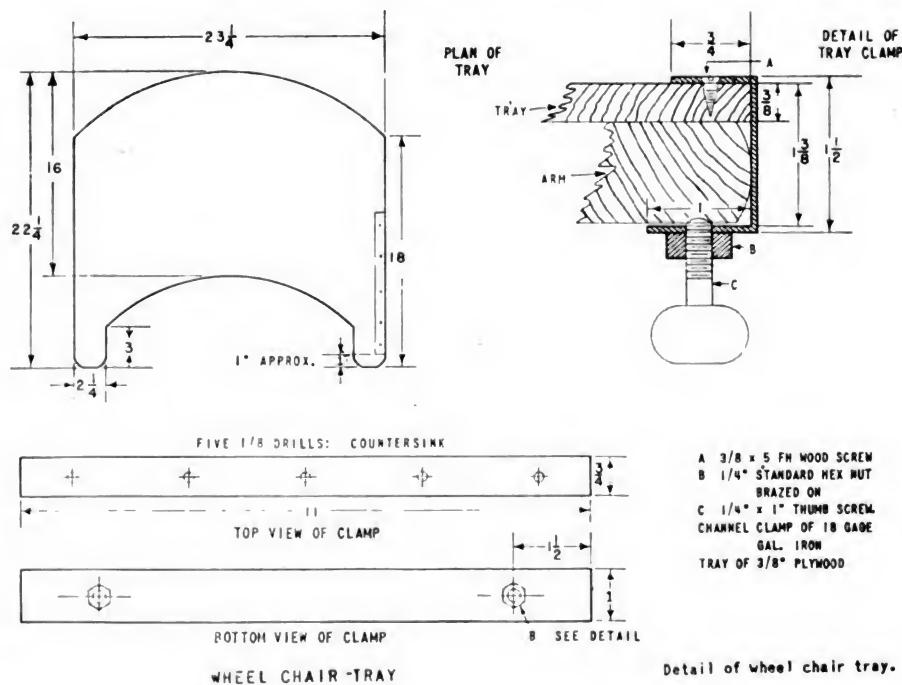




Wheel-chair board being used for writing

tribution and tray service is eliminated. The simplicity of design and construction detail is shown in the diagram.

A wheel-chair board adjustable to any size chair also has been developed. Convenience in writing and reading, for patients who are confined to wheel chairs, is made possible by this simple wheel-chair attachment. (See diagram.)



PLASMOCHIN TOXICITY

Four hundred and one patients were admitted to Gorgas and Margarita Hospitals in the Panama Canal Zone during May 1943 for suspected plasmochin poisoning and 385 of them were discharged with a substantiated diagnosis. These patients, chiefly black and foreign white males in the third and fourth decades of life, were employed as laborers by the Panama Engineering Division and were ambulatory during the routine course of therapy. None of them had been immunized against yellow fever. The authors review the 271 cases admitted to Gorgas Hospital and compare them with those admitted to Margarita Hospital. These patients had been receiving for suppressive therapy one tablet (0.1 gm.) of atabrine three times a day for five consecutive days, no medication on the sixth and seventh days, then for the next five days 0.01 gm. of plasmochin three times daily. The authors say it is evident that plasmochin is a dangerous drug, which at present is employed at Gorgas Hospital only in selected recurrent cases of malaria, and in all cases which persistently reveal the sexual forms of the parasite in the peripheral blood, after an adequate course of another antimalarial drug (atabrine or quinine) has been prescribed. They recommend that the dosage of plasmochin be modified because of the small margin of safety and the individual sensitivity occasionally encountered. The dosage at Gorgas Hospital has been reduced to 0.01 gm. twice daily for a period of three days. It is also felt that plasmochin should not be used in the field or in any ambulatory cases, but in a hospital, where more careful observation by the physician is possible. When early signs of toxicity appear, the drug must be discontinued. If jaundice, pallor, or impending shock occur, then energetic measures of therapy as outlined (blood transfusion, intravenous fluids, etc.) should be instituted. Laboratory studies, particularly daily blood counts and urine analysis, are important in the diagnosis, treatment, and follow-up of each case. The role of atabrine in the introduction or accentuation of toxic symptoms cannot be fully evaluated, but it is considered as a negligible or minor factor.

Of 4,361 laborers placed on a suppressive ambulatory routine for malaria, 489 cases (10.13 percent) developed toxic manifestations of plasmochin poisoning. The individual syndrome varied in severity, but the more seriously ill presented the typical clinical and laboratory pattern of acute intravascular hemolysis. All cases recovered on a therapeutic regimen which included alkalinization of the urine, intravenous fluids, and blood transfusions; and no permanent effects were noted. Plasmochin presents a potential danger to the patient and the reduction in dosage and the hospitalization of cases receiving the drug are recommended.

Abstract of article by Lieut. Colonels Maurice Hardgrove and Irving L. Applebaum, M.C., A.U.S., submitted through The Surgeon General's Office to the Journal of the American Medical Association.

THE MEDICAL BADGE

A medical award has been authorized by the War Department in recognition of service rendered during combat by members of the Medical Department assigned or attached to the infantry. The badge is of silver with the medical insignia and the Geneva cross superimposed on a litter surrounded by a wreath of oak leaves. It is to be worn on the left breast above decorations and service ribbons. The badge will be awarded to Medical Department personnel regularly assigned or temporarily attached during combat to the medical detachments of infantry regiments, battalions, or elements thereof since 7 December 1941. Enlisted and officer personnel below field grade are eligible for the badge. However, it may be awarded to the regimental surgeon regardless of rank. Further details concerning the medical badge are contained in War Department Circular No. 66, dated 1 March 1945.



CONSULTATION SERVICES

Mental hygiene clinics, known generally as Consultation Services, are functioning effectively in seventeen Army Service Forces training centers and in eighteen Army Ground Forces replacement training centers. These units are staffed by psychiatrists, commissioned psychologists, social workers, and, in some instances, Red Cross workers. The goal of the Consultation Services is the maximum conservation of manpower consistent with military effectiveness. This is achieved by conducting psychiatric outpatient departments and employing the techniques of the best civilian mental hygiene clinics in all basic training centers. All maladjusted trainees capable of being adjusted in the Army are continued in training; others are recommended for discharge. The psychiatrists of the Consultation Services held a conference at the Aberdeen Proving Ground in January. A similar meeting of commissioned psychologists was held in Chicago in February.

The chief emphasis in the Consultation Services is prevention. The staffs of the units do not function as mere outpatient clinic personnel, but are engaged in seeking out and correcting

the sources of maladjustment in the training centers to which they are assigned. An active educational campaign through personal contacts and lectures to the training center staff and the trainees is being constantly conducted. Cognizance of the vital role of motivation in the mental health of the soldier is stressed. War Department Technical Bulletin TB MED 156, on consultation services, has just been completed.

In October 1943, the military occupational specialty of psychiatric social worker (MOS 263) was created. In July 1944, these personnel were declared critically needed specialists. Up to this time, the specifications for SSN 263 (specification serial number) included graduation from a recognized school of social work or at least two years of supervised experience in case work activities. Efforts are now being made to reduce, somewhat, these qualifications. Psychiatric social workers have been found invaluable as assistants to psychiatrists in every type of psychiatric installation. At present there are about 450 psychiatric social workers in the Army, and there is need for hundreds more. In order partially to fill this need, 250 WACs with less educational and experiential qualifications were recently enlisted. They, too, have proved of great worth. It is planned to give this group of less qualified psychiatric social worker assistants a separate SSN. The establishment of schools in which to train new personnel of this type and in which to further educate military psychiatric social workers is now contemplated. War Department Technical Bulletin TB MED 154, on psychiatric social work, will soon be issued.

THE NEUROPSYCHIATRIC SCREENING ADJUNCT

The Neuropsychiatric Screening Adjunct which has been in use in induction stations about six months has been found to be a useful test in the detection of psychoneurotic individuals; however, the test has been misused in certain instances.

The purpose of the test is to make possible a saving of time for the neuropsychiatric examiner. The test operates to this end by selecting two groups, containing on the one hand "normal men," and on the other hand "neurotic" individuals. It is not intended as a substitute for the complete neuropsychiatric examination but was designed to detect emotional instability, the degree of which is indicated by the numerical score obtained. The critical or so-called "stop" questions were arbitrarily added in order to detect certain commonly encountered serious defects. The test is not designed nor intended to detect organic neurological diseases, constitutional psychopathy, or mental deficiency.

A positive answer to one of the questions does not in itself mean there is a critically significant symptom present. It merely represents the individual's belief to this effect. The validation studies made have proved that when there are a significant number of positive answers (score of 17 or below) or one of the

critical questions has been answered positively further clinical examination is required finally to determine the individual's emotional stability.

The discriminating value of the test is found in the individual's numerical score and not in his answer to any specific question contained in the test. This fact has been extensively validated by studies conducted in induction stations, hospitals, and field units. Large numbers of men on duty were administered the test. It was found that 95 percent of the men who scored 18 or better rendered effective military service. The test was also given to a large number of psychiatric patients in hospitals. Ninety percent of the men who are not effective because of psychiatric disorders scored 17 or below. Thus it is seen that, at the discretion of the examiner, a score of 18 or higher may be considered sufficient evidence of an individual's emotional stability for him to be accepted without further clinical psychiatric examination, unless he has given a positive answer to a critical (stop) question.

That many who scored 17 or lower rendered effective service makes imperative a clinical psychiatric examination of these individuals in the induction station. Many men who scored 17 or below will be found acceptable after careful psychiatric examination.

Thus it may be seen that the Neuropsychiatric Screening Adjunct is not intended to be used as a means of obtaining a supplementary social history, nor as a means of detecting organic conditions. Regardless of the score made on the "NSA," individuals must still be examined neurologically. However, when used as intended, it will be found that more time will be available for the clinical examination of those doubtful cases and that less time will be needed in the routine examination of "normal" cases.



Neuropsychiatric ward of a division clearing company on Leyte.

DISPOSITION OF NONEFFECTIVE PERSONNEL

For several months extensive studies regarding certain aspects of medical disabilities especially neuropsychiatric and particularly psychoneurosis in the military service have been in progress. These studies were conducted by the Personnel Division G-1, The Inspector General, the Air Surgeon, and The Surgeon General. A combined report was made to the Deputy Chief of Staff. As a direct result of these studies a War Department circular will appear shortly which will state the War Department policy with respect to disposition of these cases both administratively and medically. This directive will give official recognition to the principles discussed in the article "Abuse of Medical Disposition Channels," published on page 34 of the February 1945 *Bulletin*. Reiteration will be made of the principles that neurotic symptoms in themselves will not be sufficient cause for the diagnosis of neurotic conditions and that even a diagnosis of a type of neurosis does not in itself justify discharge. It will be clearly stated that it is the responsibility of the medical officer merely to decide whether a man is sick according to accepted medical practice and whether or not he is entitled to a medical discharge. If it is the medical officer's opinion that the man can do duty because he is not sick or in spite of certain conditions, then it becomes an administrative responsibility as to whether there is a place where he can serve. If not, the problem is one for command. Thus command and medical responsibilities are more clearly defined than heretofore.

Another important consideration is that the term "psychoneurosis" will be discontinued in military medical records. The various types such as "anxiety state," "conversion hysteria," etc., are sufficiently well defined to justify their use without being prefaced by the term "psychoneurosis." The particular type will be used followed by the severity, the nature and degree of the precipitating stress, an estimate of the predisposition of the individual, and an estimate of the amount of disability. The terms "operational fatigue" and "exhaustion" will be acceptable as a working diagnosis for those cases occurring in combat until a definitive diagnosis can be established.

THE DIAGNOSIS OF SCHISTOSOMIASIS

The article by this title in the April 1945 *Bulletin*, page 104, contains a statement implying that infection with schistosomiasis can be avoided by bathing at night. It can be definitely stated that waters infested with schistosome cercariae are not safe at any period of day or night. Cercariae are liberated from infected snails for several months and remain viable for at least one or two days after emergence, allowing no period of safety.

GARBAGE DISPOSAL AT A PACIFIC OCEAN BASE

The following photographs of the garbage disposal and can-washing facilities at a Pacific Ocean base were recently received in The Surgeon General's Office. As illustrated in figure 1, garbage is delivered by truck to the can dumping point in standard G.I. garbage cans. A concrete block facilitates the emptying of



FIGURE 1. Garbage disposal, can dumping point. (Army Medical Museum negative No. 85268)

the garbage into the ocean. The garbage cans after being emptied are thoroughly cleaned with live steam, produced by a converted Japanese steam locomotive. Steam is admitted to the inside of the cans by means of ten vertical pipes, (A, figure 3). Bent steel reinforcing rods, B, elevate the inverted cans from the floor and allow the steam to escape. A valve in a valve box, C, is provided for each riser pipe so that one to ten cans can be washed at one



FIGURE 2. Garbage can washing—steam boiler. (Army Medical Museum negative No. 85271)

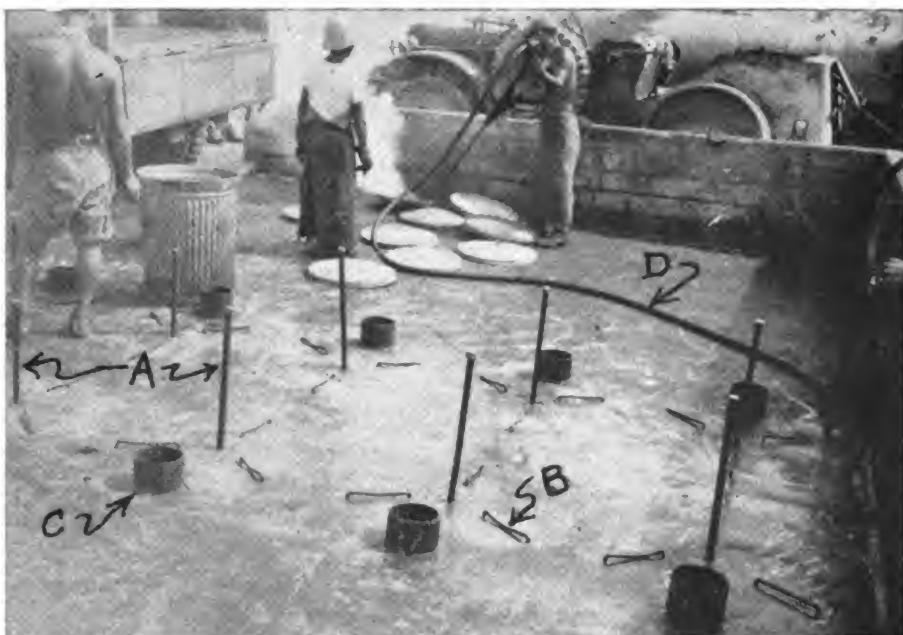


FIGURE 3. Garbage can washing platform. (Army Medical Museum negative No. 85269)



FIGURE 4. Garbage can washing platform in operation. (Army Medical Museum negative No. 85270)

time. A separate steam hose, *D*, with a pipe extension for washing of the garbage can lids and outside surface of the cans is shown in figure 3. Drainage from the platform empties into the ocean. Cans are inverted over the vertical riser pipes (figure 4), and steam turned on to cut the grease and remove other foreign material. Photographs and descriptions of novel and practical designs of garbage disposal areas and can washing platforms used in other areas should be forwarded to the Sanitary Engineering Division, Preventive Medicine Service, Surgeon General's Office.

NOTES FROM A FLIGHT SURGEON

Emergency rescue squadrons operate in the far Pacific areas in order to rescue air crews forced to abandon their planes during combat missions and to assist in evacuating sick and wounded from remote battle areas. The crew compartment of the rescue plane is equipped with four bunks for litter patients, and in another compartment, in emergencies, an additional two to four litter patients can be carried. The unit equipment, which was too heavy, was disassembled, and medical supplies were packed in smaller and much lighter containers.

The flight surgeon or surgical technician supervises the transfer of survivors to the rescue plane, after they are located in the sea or in the jungle. Anyone who has manipulated a rubber life raft in a rough sea well knows the difficulty of conveying survivors from offshore to the plane. This is done by three men with a Stokes litter on which the patient lies crosswise on the gunwales in the center of the raft. One man on either end paddles, and the third keeps the patient from being dumped into the sea. On reaching the outlying plane, a line is passed from each end of the raft, then the crew members in the aft section lift the patient aboard. The danger is ever present that the raft may capsize. Major Donald D. Corlett, flight surgeon with an emergency rescue squadron, summarizes some of the rescue missions in his historical report of 1 October 1944.

1. A message was received in July to proceed to Lake Rombebai, Dutch New Guinea, to evacuate wounded men from an outpost on the shore of the lake in enemy territory. The PBY, piloted by Captain Wientjes, proceeded to the area, circled the lake several times, and located the men. They taxied within 100 yards of the shore, launched the life raft, and found ten soldiers, seven of whom were wounded, and one wounded Jap prisoner. The ten men, sleeping in hammocks, had been attacked by fifty Japs, who sneaked up on the guard. The men fought with their fists and clubs, and, during the battle, a Yank slipped away to the beach and fired a signal flare, which disconcerted the Japs. The Americans and Aussies then seized their guns, killed three Japs, and wounded one whom they made prisoner. Fifteen other Japs in attempting to reach their canoes were shot down. When the rescue ship arrived, the camp was in shambles. The medical officer aboard the rescue plane prepared the injured for evacuation. With all aboard, the plane taxied into deep water, but heavy equipment and 500 gallons of gaso-

line had to be thrown overboard before the third attempt to take-off was successful. The survivors were transported to Owi, where ambulances transferred them to the 92d General Hospital. They said, "We prayed for daylight, and if heaven looks anything like a PBY, we are going to change our ways."

2. In September, while covering a B-24 strike on Palau Island, Lieut. Remington, pilot of Daylight 19, received a message that a pilot had sighted a life raft 125 miles south of Palau. Four men were found aboard the raft, the other six having gone down with the ship. The engineer, a man weighing 220 pounds, had a fracture of the ankle, three fractured ribs, internal injuries, and was in shock. He was hoisted into the plane with great difficulty. The gunner sustained cuts about the head. The ambulant survivors were taken aboard the rescue plane.

The pilot of the doomed B-24 stated that his ship was struck by antiaircraft fire after he had released his bombs on the objective. All his radio equipment and two engines were put out of commission. He fell behind the formation, was not seen by the other crews, and was forced to land in the open sea. The plane submerged ten minutes later. Six members of the crew apparently killed in the crash went down with the ship. The survivors when sighted were under full sail for Biak Island, 300 miles away.

3. In September, Lieut. Barnes, pilot of the rescue plane, Daylight 11, departed from Middleburg Island to cover a B-24 strike on Balikpapan, Borneo. He reached his orbit point in the Gulf of Toronalo and, circling for three hours, sighted a B-24 coming away from the target with one engine afire. The B-24 crew parachuted into the sea. Lieut. Barnes landed and taxied two miles down the line of survivors until the entire crew of ten were taken aboard. The ship was unable to rise from the sea. All guns, ammunition, and 150 gallons of fuel were jettisoned, and after four more attempts the ship rose, bounced from swell to swell, and took to the air. When the rescue plane approached its base, an air raid was in progress and it was forced to circle until allowed to land. The time of the mission was seventeen hours and twenty-five minutes, the longest mission up to this date. Its success was due to the skill and good judgment of the pilot and his gallant crew.

PENICILLIN SALVAGE

The pharmacy personnel of the Station Hospital, Camp Croft, S. C., and the medical officers have instituted a salvage and reclamation project which may be useful to other medical installations and make possible penicillin therapy where it would not ordinarily be practicable. Captain E. J. Dieter, M.A.C., reports that it was noted that each penicillin vial that was turned in for salvage had a residue of one or two drops of penicillin solution. The caps were torn off the vials with ordinary pliers and the inverted vials allowed to drain into a clean graduate. The solution is stored in a refrigerator until ready for use *in topical applications only*, such as ointments, eye washes, and throat sprays. A procedure as sanitary as possible should be followed, but a sterile procedure is impracticable. No determination of potency is attempted and some loss is assumed; however, the users of these products are satisfied with the therapeutic effects achieved by the topical applications of the salvaged penicillin.

PREVENTION OF MOLD ON BOOK BINDINGS*

In warm climates following a long rainy spell, book bindings frequently support a heavy growth of mold, which, if unchecked, will disfigure the books. While mere dusting removes the superficial growth, it does not disturb the mold growing in the paste of the bindings. Several years ago, following a wet season, the Duke Hospital Library had an epidemic of mold in bound journals which stood near an underground ventilator drawing air from an open areaway. Duncan C. Hetherington, of the Department of Anatomy, Duke University School of Medicine, was called on for suggestions to remedy the situation. The vent was closed and the following solution was wiped over the molded bindings: thymol crystals, 10 gm.; mercuric bichloride, 4 gm.; ether, 200 cc.; benzene, 400 cc.

The treated volumes have never since shown any tendency to mold, and any other outbreaks of mold have been similarly and effectively treated. The solution is poisonous and inflammable and should be used carefully in an open room or outdoors with no source of fire nearby. It is best applied with a cotton sponge tied to a suitable applicator or held by forceps, so that none of it gets on the fingers. The solution penetrates the bindings readily and dries rapidly, leaving no precipitate. One application is usually sufficient and the books may be returned at once to their places. It is wise to test first one corner of the binding before using the solution, to discover whether the dye may run or change in any way. In our experience it has not altered the appearance of the goods nor affected the letter stampings. The solution may, as well, be safely used on record album backs, leather boxes, and luggage, but it should *never* be used on any wearing apparel.

THE BULLETIN INDEX

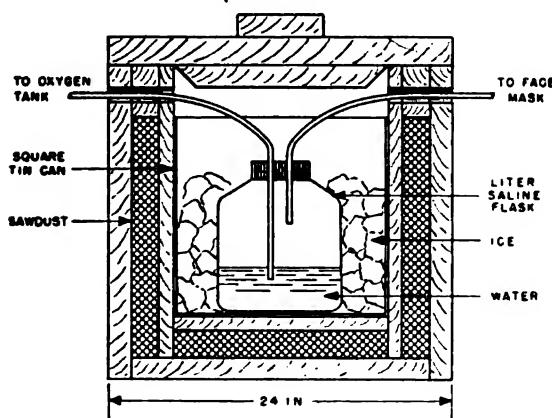
A combined subject and author index of *The Bulletin* has been prepared covering the period from the inception of the new publication in October 1943 up to and including the December 1944 issue. Copies of this index will be mailed for the libraries of all Medical Department installations. Individual copies for Medical, Dental, Veterinary, and Sanitary Corps officers may be obtained on request to The Surgeon General's Office (Attention: *The Bulletin*).

American Board of Internal Medicine.—The next written examination of this Board will be held on 15 October. The final date for acceptance of applications is 1 August 1945. Candidates in the armed forces may take the written examination at their station of duty with the permission of their medical commanding officer. The secretary of the Board is James J. Waring, M.D., 4200 East 9th Avenue, Denver, Colorado.

*Reprinted from *Science*, 2 March 1945, page 223.

DEVICE FOR COOLING OXYGEN ADMINISTERED BY FACE MASK

One of the problems encountered in tropical nursing is the administration of oxygen. Face masks are used almost exclusively, as oxygen tents are not always available. In a hot and humid climate, the face mask is a source of discomfort to the patient. The inflow of oxygen is warm and the patient complains of a sensation of suffocation. The skin is constantly moist and there is a tendency to excoriation at pressure points over the bridge of the nose.



A patient admitted to the hospital with an undiagnosed lung disease had symptoms of dyspnea, tachypnea, and severe cyanosis, which necessitated the administration of oxygen twenty-four hours a day for several weeks. Although the

patient was critically ill, he was mentally alert and acutely aware of the discomforts of the face mask. To alleviate these discomforts, First Lieut. Fern E. Christensen, A.N.C., writes that a device consisting of an improvised ice chest and a discarded liter saline flask with connecting tubes was constructed for cooling and humidifying the oxygen. This apparatus was economical to operate, requiring icing only twice daily. The results were good. The cooling of the oxygen was an aid in keeping the patient mentally at ease, there was less perspiration around the mouth and nose, and the skin was kept in good condition.

PREVENTIVE MAINTENANCE

The expression "Preventive Maintenance Today Prevents Breakdowns Tomorrow" has been adopted for use as often as possible by the Maintenance Division, Army Service Forces. A modern Army is so dependent on efficient functioning of technical facilities that preventive maintenance becomes more and more important. This expression is featured on a poster that has been distributed to all motor pools and shops throughout the Army, and it will be used whenever possible on all posters from the Maintenance Division, two of which are distributed throughout the Army each month.



MEDICAL DEPARTMENT MAINTENANCE

The saving of lives on battlefields depends, in part, on the proper maintenance of equipment. To assist in maintaining its equipment, the Medical Department has developed a program which comprises the following features: (1) Development of spare parts lists and the initiating of procurement of these parts. (2) The publication of technical literature relating to the maintenance and repair of equipment. (3) Establishment of fifth echelon repair shops. (4) In the zone of the interior, providing for additional technical advice rendered by medical equipment liaison officers. (5) Training enlisted men and officers in medical repair procedures.

As of 5 February 1945, eighty-seven spare parts lists had been developed covering fifty-three technical medical items. Procurement had been initiated on 2,431 various spare parts. Almost one and one-half million parts had been issued to the field as of this date. Most of these issues were to overseas installations. Nearly five million more parts were on order to provide for replenishment of oversea issues and to provide issues for zone-of-the-interior installations. All spare parts lists are reviewed for adequacy at least once every six months, and, if deemed necessary as shown by the usage rate, quantities are increased. New spare parts are added when the need is indicated. A constant study of nonstandard parts is maintained for this purpose. Proper and continuous supply of necessary parts for field repair is thus assured.

Technical literature published by the Medical Department includes technical manuals, lubrication orders, modification work orders, and miscellaneous publications, such as technical bulletins and supply bulletins pertaining to maintenance. Manuals are written to provide the operator of the equipment with instructions necessary properly to uncrate, set up, install, operate, maintain, and prepare the equipment for storage or shipment. It is the operator's textbook on the piece of equipment to which it pertains. It is an aid in training, helps standardize operation and maintenance procedures, and is a ready source of technical information in the field. A copy of the appropriate technical manual must accompany the equipment when issued and should be kept with the equipment at all times.

Lubrication orders are illustrated charts which outline lubrication periods and procedures for various pieces of equipment. The proper lubricants are specified, and lubrication under unusual climatic conditions and conditions of use are discussed. The procedures outlined are mandatory, and a copy of the lubrication order must be kept with the equipment at all times.

Modification work orders are mandatory instructions requiring modification of a piece of equipment. Changes are made to increase efficiency and safety or to eliminate parts which have

been failing consistently and replace them with parts of a more satisfactory design.

Technical bulletins provide an expeditious way of getting information into the field quickly. The information so published is subsequently incorporated in the technical manual to which it pertains when the manual is revised.

The third feature of medical maintenance is the establishment of fifth echelon repair shops of which the Medical Department now has three, one at the St. Louis Medical Depot, one at the Denver Medical Depot, and a third is being organized at the Louisville Medical Depot. These shops perform complex technical repairs and replacement of parts on items assigned to them. They employ skilled labor and are properly equipped with machine tools for the reconditioning of large items.

Each distribution depot in the zone of the interior has assigned to it one or more medical equipment liaison officers who act as technical consultants on medical equipment maintenance to the installations in their respective distribution areas. When called on, they aid in installing equipment, instructing the operator, and giving advice on repair procedures, and they act as a clearing house for technical information.

A Maintenance and Repair School, operated at the St. Louis Medical Depot, in a four-month course trains officers and enlisted men as medical maintenance men. Half of this time is spent on x-ray equipment and half on sterilizing equipment, gas anesthesia equipment, physiotherapy equipment, and other miscellaneous technical items.



Issue room of supply depot of the 232d Medical Company Battalion. Naples, Italy. 18 August 1944.

STANDARDIZATION OF ARTIFICIAL LIMBS

At the request of The Surgeon General, the Subcommittee on Orthopedic Surgery of the National Research Council called a conference in Chicago 30 January to 1 February attended by representatives of the National Bureau of Standards, Army, Navy, Veterans' Administration, scientists, and artificial limb manufacturers to consider the problem of standardization and improvement of artificial limbs.

As a result of this conference, the National Research Council in February made definite plans for a committee for research and development in limbs. The various Army amputation centers will cooperate with this committee for the clinical evaluation of appliances that may be subjected to trial. A complete chart of stock sizes has been prepared which will enable the Army amputation centers to fit almost any size desired. Exceptional cases may require special order. A complete assortment of the parts that go into an artificial leg will be made available so that each center will be able to continue the policy of making custom-built legs for each amputation case.

An improved artificial leg providing the best innovations and improvements of legs now in use will soon be available for use by the Army. A cast aluminum knee joint for above-the-knee legs, consisting of skin-top and a knee block, and a cast-aluminum ankle assembly, consisting of shin and foot sections, have been adopted. Both are to be produced in quantity with the necessary modifications for bonding to metal, plastic, or fiber. Specifications for joints will provide for the best material and workmanship and will compare to the highest industrial standards. Training courses have been established for orthopedic mechanics from each center to receive training in metal and plastic limbs.

NO RELAXATION OF ANTIMOSQUITO PROGRAM

Information received from overseas theaters indicates that the incidence of clinical cases of malaria in troops taking suppressive atabrine is lower than has previously obtained. It is desired in this connection to emphasize that we should not be lulled into a sense of false security because of these lowered rates. There should definitely be no relaxation of the anti-mosquito program for the control of malarial infections in endemic areas, as this would undoubtedly result in a great increase in actual infections which would not be recognized until suppressive therapy is stopped. This, in turn, would result in an enormous number of malaria patients requiring hospitalization at a time when the demands for beds for the wounded have become so numerous.

NEW LARVICIDE AND RESIDUAL DDT SPRAYER

The Sanitary Engineering Division of the Preventive Medicine Service has cooperated with the Office of the Chief of Engineers in developing a new larvicide and residual DDT sprayer which will be designated by Engineer stock number 41-7839.400-.030 and known as "Sprayer, insect, knapsack type, plunger type,



cylindrical shape, 3-gallon capacity." It has a stainless steel tank, 7 by 19 in., inclosed plunger pressure pump, 5 ft. of oil-resistant hose, leakproof gun, $\frac{1}{4}$ -in. brass pipe nozzle extension rod with detachable nozzle and spare parts. In addition to the nozzle on the nozzle extension rod, three nozzles for various uses will be stored in the hollow pump handle. This apparatus has been developed to provide larvicing and residual spray personnel with a small, lightweight sprayer, easy to handle, durable, and leakproof.

It is expected that initial shipments will be made in May 1945. Subsequent production will be for zone-of-interior installations.

INSECT CONTROL WITH DDT

Ample amounts of DDT are now available for all types of uses for insect control by the armed forces. Field reports continue to substantiate the unprecedented effectiveness of this new insecticidal agent. Those responsible for insect control should make full use of DDT in controlling mosquitoes, flies, and other disease-carrying insects. DDT employed for its residual effect against adult mosquitoes and flies is proving spectacularly effective. The destruction of infected adult insects breaks the chain of transmission of malaria and other insect-borne diseases. The use of the long-lasting residual effect of DDT is considered one of its most important applications. In some theaters of operation, treatment of all kitchens, mess halls, barracks, tents, and nearby native habitations is now being carried out at regular intervals of from one to two months. The spraying of DDT solutions from airplanes has given excellent area control of mosquitoes and has abruptly halted several epidemics of dengue in overseas installations. The health and comfort of troops will greatly benefit by full use of the DDT insecticides.

FILM BULLETIN ON DDT

War Department Film Bulletin (FB 195), "DDT—Weapon Against Disease," will soon be available from all Signal Corps film libraries and sublibraries. The film portrays something of the development of DDT as an insecticide and the early uses made of it by the Army. There is suggested the tremendous importance which the compound may play in the future prevention and control of insect-borne diseases, such as typhus, malaria, dengue fever, and plague, with respect to large populations both in and outside of military service. The film is intended for showing to general audiences. Running time is about twenty minutes.

CONFERENCE ON PREVENTIVE MEDICINE

A conference of Army preventive medicine officers was held on 14 to 16 February 1945, at the School of Hygiene and Public Health, Johns Hopkins University, Baltimore. The meeting was arranged by the Preventive Medicine Service, Office of The Surgeon General, for the purpose of reviewing the Army's policies with respect to prevention of disease among troops and new developments in this field. An opportunity was provided also for discussion by the officers responsible for carrying out the preventive medicine program. The conference was attended by 46 officers, including the chiefs of preventive medicine in the headquarters of all service commands and medical inspectors from the larger stations in the United States, representatives of the Air Surgeon and the Chief Surgeon, Army Ground Forces, and officers from Headquarters, Air Transport Command, Headquarters of the Second and the Fourth Armies, and from the ports of embarkation.

Brig. General S. Bayne-Jones, deputy chief, Preventive Medicine Service, Surgeon General's Office, opened the conference with a discussion of the broad aims of the Army's preventive medicine program. The subjects considered during the opening session were diphtheria control, sulfadiazine prophylaxis of respiratory diseases, immunization procedures, insect control, measures designed for reducing the incidence of trench foot, and intestinal disease control. Colonel George R. Callender, M.C., director, Army Medical School, presented new developments in immunization with triple typhoid vaccine.

Among the topics discussed at subsequent sessions were: the organization of sanitary engineering programs in the service commands, the scope of the Army's interest in industrial medicine, the public health aspects of the introduction of tropical diseases by returning troops, epidemiological functions of service command laboratories, venereal disease control, the Army nutrition program, and foreign quarantine in military traffic. Brig. General Raymond A. Kelser, director, Veterinary

Division, Office of The Surgeon General, described the "Meat, Meat-Food, and Dairy Products Inspection Service" of the Army Veterinary Corps.

The final afternoon of the conference was devoted to descriptions by various representatives, of the organization and operation of preventive medicine activities in the different commands. The principle of application of measures for prevention of disease by officers trained in this field, as set forth in AR 40-200, was stressed.

CONFERENCE AT 300TH GENERAL HOSPITAL

Medical officers from the Mediterranean Theater of Operations attended a conference at the 300th General Hospital in Italy on 26-27 January to discuss medical and surgical problems. The scientific sessions comprised clinical demonstrations, lantern slide lectures, ward rounds, papers, and reports of cases. A medical art exhibit was provided by the medical composite detachment of the Museum and Medical Arts Service. The general sessions, presided over by the commanding officer of the hospital, Colonel George W. Reyer, were addressed by Major General Morrison C. Stayer, surgeon of the theater, Brigadier General Joseph I. Martin, surgeon, Fifth Army, Colonel Frank Berry, surgical consultant, Seventh Army, Colonel Perrin Long, medical consultant of the theater, and Lieut. Colonel Tracy B. Mallory of the 15th Medical General Laboratory. The two-day meeting closed with a dinner-dance. The photograph shows a part of the delegates and visitors who attended the conference.



PORTABLE DISINFECTOR

The item number and nomenclature of Disinfector, portable, Item No. 7791000, has recently been changed to Disinfector, trailer type, Item No. 9924650. This item was designed and standardized for the purpose of assuring the Medical Department a rugged, portable, pressure steam sterilizing unit, suitable for field military use. It is an integral trailer, is self-contained, and consists essentially of a steam-jacketed sterilizer, steam-generating boiler, water-heating device, oil burner, fuel and water tanks, and accessories. The disinfector is equipped with six shower heads providing bathing facilities for six men at one time and is able to produce water heated to 110°



FIGURE 1. Disinfector, trailer type, Item No. 9924650.

F. in thirty minutes. Under actual field conditions one hundred enlisted men have taken showers between 1530 and 1830. When used as a disinfector this unit has adequately, in one operation, disinfected two hundred and fifty articles at a heat of 200° F. in thirty minutes.

Disinfector, trailer type, is also adaptable for use with Item 9950000, Sterilizer, dressing and utensil, by providing steam heat through a direct steam line connection to the sterilizer. No steam regulator is required for operation with the disinfector. An additional feature of this disinfector is its ability to produce distilled water. This is accomplished by Distilling apparatus, 7½-gallon, Item 9954600, which is a water-distilling apparatus of 7½ gallons per hour capacity. This apparatus is mounted on one side of the disinfector, trailer type, and connected to water and steam piping of the same. It must be noted, however, that distilled water produced by



FIGURE 2. Shows distilling apparatus, 7½-gallon, Item No. 9954600.

this method is not pyrogen free. This disinfecter has proved its merit by its economy and simplicity of operation. It is efficient for the purposes mentioned. It will withstand rough usage and has proved its adaptability for rapid movement under field conditions.

PORTABLE FIELD SHOWER UNIT

The EC-3 shower unit, trailer mounted, is designed to produce 16 gallons of warm bathing water per minute through eight shower heads. Its total weight is 3,525 pounds; and its total volume is 540 cu. ft. of water. A location along the bank of a stream, lake, or other source is selected where the suction lift will not be greater than 15 ft. To start, the unit is leveled, the shower stand set up, and provision made for disposal of the waste water—usually by a ditch to the stream or lake, downstream or a reasonable distance away from the point where the suction pipe is placed. When possible, duckboards should be placed under the shower heads and to a place where the men may dry and clothe themselves. The unit is then placed in operation. Temperature is regulated automatically so that the finished water ranges from 105° to 110° F. When the temperature of the water source is very low, it may not be possible to provide 105° water, but the unit will raise 16 gallons per minute of water approximately 50° in temperature. This unit will provide for from 60 to 80 men per hour. In areas where schistosomiasis is a hazard, special treatment of the water before use will be necessary. Storage for one hour, with a chlorine residual of 1 p.p.m. at the end of that period should be provided. For complete description of this unit, see War Department Technical Manual (TM 5-9722), dated 18 September 1944, Shower-unit, field, trailer-mounted, with heater, 8 shower heads, Clever-Brooks Model EC-3.

ELASTIC BANDAGES

There is a critical shortage of Ace bandages (Bandage, elastic, all-cotton, Nos. 2002200-400). This type of bandage is required for the proper treatment of amputation stumps and is often indicated after the removal of extremities from plaster and for compression dressing of burns and other wounds. It has been observed that elastic bandages are frequently used in the routine application of splints, dressings, and traction where less critical items such as gauze or muslin bandages will suffice. To conserve the limited supply, the use of elastic bandages will be restricted to conditions which require elastic compression bandage.

SUPPORT OF FINGERS AND THUMB IN RADIAL NERVE PARALYSIS

In the treatment of fractures of the humerus or forearm bones associated with radial nerve injury it is frequently necessary to continue the use of plaster. Extension support of the fingers, and where possible of the wrist, should be flexible in order to permit active motion.

The following simple method of supporting the thumb reported by Major Howard A. Swart, M.C., has been of great value in these cases and utilizes material readily available. As a substitute for spring wire or steel, metal box binding, measuring 5/8 by 20/1,000 of an inch, is easily obtainable. The support for the fingers consists of a 24-inch piece of this metal, doubled and riveted together. One end is incorporated in the plaster on the dorsum of the wrist and is bent so that it extends out over the fingers in the form of an arch.

The second piece, somewhat shorter, is fixed in the plaster on the radial side of the forearm and bent so that it holds the thumb in the position of opposition. The metal is easily bent and clothing can be put on without trouble by depressing the bands. Number 8 gage wire, similar to that used in the construction of drop foot braces, could be used equally well.

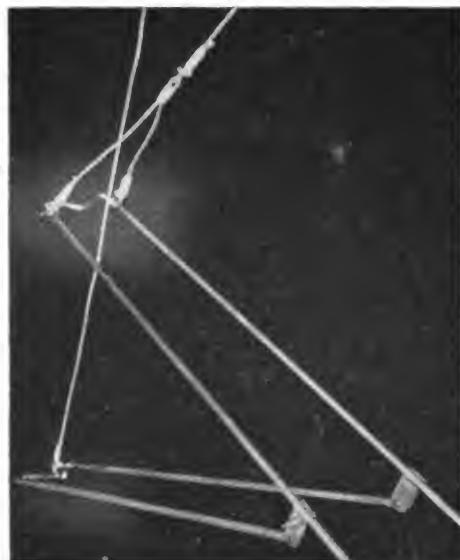
Two small rubber bands

are attached to the dorsal band and fixed to a small piece of wood, cut to length and shaped to the contours of the fingers. This support is placed beneath the proximal phalanges of the fingers. The rubber bands are attached to the center of the wood support and the fingers are thereby held in 180 degrees' extension at the metacarpophalangeal joints. More or less extension may be produced by shortening or lengthening the rubber bands. The fingers are held in slight flexion at the interphalangeal joints. To support the thumb, a loop of adhesive plaster, lined with gauze bandage, is made. This is 1 inch wide by 4 inches long. It, in turn, is fixed to the radial metal band by short rubber bands. In this way the fingers are supported in extension and the thumb in the position of opposition or grasping. Active flexion is encouraged against the pull of the rubber bands. This has served to prevent flexion contractures of the thumb and fingers and to preserve motion in the joints of these digits. "No originality is claimed for this method, which was first seen applied to patients who came from overseas hospitals. It was adopted for our use by the head of our plaster room, Sgt. William Gaskin."



ARMY LEG SPLINT

An Army leg splint with Pierson attachment for suspension traction treatment, designed by Lieut. Colonel Vernon L. Hart, M.C., has the steel rings welded at the end of the leg splint and Pierson flexion attachment to which the ropes are tied. This modification eliminates the inevitable slipping of ropes and rotation of splint when the ropes are tied and fixed with adhesive direct to the ends of the apparatus.

**CERTAIN WOUNDED ENLISTED MEN MAY BE DISCHARGED**

The War Department announced 26 March that enlisted men wounded in combat—other than those returned to the United States for temporary duty—who have been returned from overseas may be discharged on their request, under the following provisions: (1) they are physically classified as permanently limited assignment; (2) have been awarded the Purple Heart; (3) have been determined to be surplus to the needs of the Army as a whole.

No enlisted man will be considered surplus if an assignment is available appropriate to his grade; if such an assignment would release for overseas shipment a man who has not had overseas service, or if the returnee can with a reasonable amount of retraining be effectively utilized. First determination of surplus will be made by the major command—Army Ground Forces, Army Air Forces, or Army Service Forces—to which the soldier is assigned. If this command finds the soldier surplus, he will be sent to a personnel center where the other two major commands will make their determinations. If no assignment exists for the soldier, he will be transferred to a separation center for discharge.

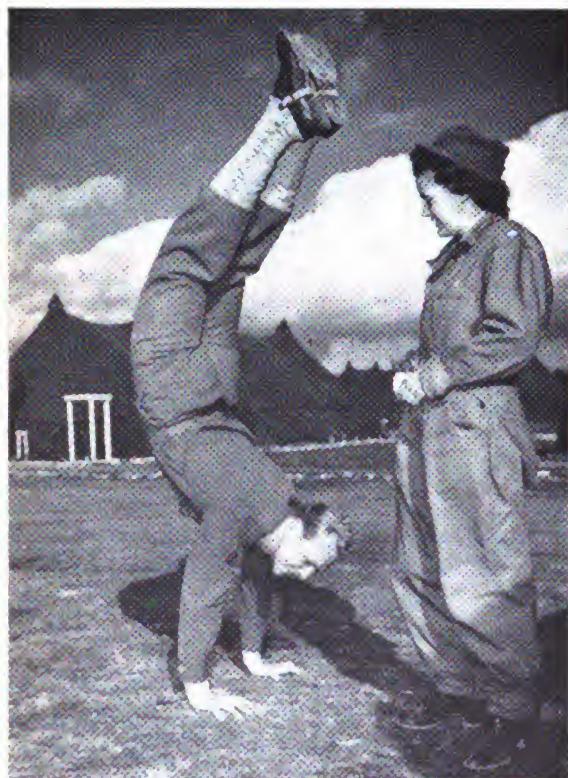
This is an extension of the policy adopted a year ago providing for the discharge of combat-wounded personnel who, as a result of their wounds, are permanently below the minimum physical standards of the Army. These men, however, are retained in the service if they specifically request it, provided their physical condition permits any reasonably useful employment.

RECONDITIONING IS PLANNED CONVALESCENT CARE

The Army's interest in convalescent reconditioning arose out of military necessity. Many patients following discharge from a hospital were being readmitted within a short time for recurrence of the same disorder. There was great wastage of manpower. Disabilities were perpetuated by unfavorable mental attitudes which made discharge from the service the only solution. The reconditioning program was created out of the military urgency of preserving manpower for further service

and the necessity of returning men physically and mentally fit to perform military duty.

Reconditioning is planned convalescent care. It is not surprising to find civilian physicians resistant to the notion of convalescent care for they have had little experience in its application. There is medical pioneering to be done in the Army's convalescent reconditioning program. Its success depends entirely on the enthusiasm, interest, and belief of the doctor. Nurses, ward attendants, and hospital staffs must be thoroughly conversant with its potentialities and its value as therapy, for through them the patient is impressed



Recovered from wounds, a soldier demonstrates to a nurse his fitness for return to duty. Signal Corps photograph.

with its importance. Physical reconditioning is only a small part of the process. It has been found that physiological regression induced by bed rest can be prevented in large part by a single set of conditioning exercises. Those recommended in the program have been carefully selected by experts in order that all parts of the body may be kept active. Remedial exercise also has been carefully planned to further the development of motion and strength. If the approved routine is followed, good physical condition can be assured. Games and sports are added for interest and further physical fitness.

Educational reconditioning, perhaps, is a misnomer and hence has resulted in confusion. Conventional classrooms,

teachers, textbooks, and blackboards are conspicuously absent in an Army hospital, for that is not the kind of educational activity to be provided. Certainly, United States Armed Forces Institute courses, as fine as they are, cannot be expected to appeal to all returning service men. Few adults who have the ambition or interest to follow academic courses while patients in a hospital. Psychological orientation or mental reconditioning, perhaps, expresses better the goal of educational reconditioning. Educational reconditioning endeavors to stimulate the mind to constructive interests, to build an adjustment to the hospital situation, to understand limitations induced by handicaps and to overcome them. It also fosters a continuing awareness of the responsibilities of everyone in the total war effort, and crystalizes public opinion and ideas as to why we are fighting and the objectives we hope to achieve after the war. It attempts to recapture through group identification the desire for further service.

The basic essentials in educational reconditioning are best stated on page 13 of TM 8-290, entitled "Educational Reconditioning." They begin with an early contact with a newly admitted patient and give attention to his personal problems and individual adjustment. In this activity the educational reconditioning personnel is assisted by the chaplain, the personal affairs officer, the Red Cross worker, the ward officer, the nurse, and other staff workers. The second phase consists in a well-planned orientation program with information concerning the current phase of the war and discussion of current problems. Guest speakers and well-selected films add much to the interest of this aspect of the program. The third phase is to develop on an individual basis the interest of the patient. Classes may be formed and volunteer instructors used to permit the educational reconditioning staff to bill programs of special interest to patient groups in the station and regional hospitals. Educational classes in these hospitals should stress professional military training. For returnees from overseas, there may be interest in blue print drawing, business education, public speaking, and many other similar interests. For those not going back to duty, job information is eagerly sought.

Occupational therapy, the third major activity in the reconditioning program, is the treatment which uses purposeful physical tasks prescribed by a medical officer for the restoration of function of injured or diseased muscle or joint, for control activity, for nervous or mental diseases, for reduction in permanent disabilities, and for purposeful utilization of leisure time. Most zone-of-interior general hospitals now have excellent occupational therapy departments. Planned convalescent care demands individualism in terms of patient needs that the medical officer, alone, can elect. Reconditioning brings to the physician technical facilities and a planned program that he may call on to assist in the rehabilitation of

patients. It behooves the medical officer to thoroughly understand the potentiality of this new therapeutic agent for convalescent management.

THE RADIO AND RECONDITIONING PROGRAMS

With hospital personnel shortages becoming more acute, a well-balanced educational reconditioning program as prescribed by The Surgeon General for Class 4 and Class 3 patients has become an increasingly difficult problem. For some time the service command consultants in reconditioning and The Surgeon General have advocated wide use of public address systems and radio within hospitals as a means of counteracting this difficulty so that the individual bed patient may benefit from the many advantages which reconditioning has to offer. One of the basic steps toward the resocialization of individuals is to facilitate the use of modern devices which are common to the society to which they will return. By establishing definite habits of listening and by using the radio to satisfy patient needs for entertainment, education, music, current events, guidance, religion, and special events, it is definitely felt and widely acknowledged that the radio fulfills this function.

Difficulties have been encountered by individual hospitals as to the type of radio equipment to be installed, lack of trained personnel for operation, maintenance and program distribution, and poor quality of programs to which patients have been subjected. All of these difficulties have hindered the progress and use of the radio to obtain maximum desired results from the reconditioning viewpoint. The emphasis placed by The Surgeon General on well-balanced radio programs for audio reception and patient participation has been recognized by A.S.F. Headquarters and preparations are being made to procure and install standard radio sets of the best quality in all general hospitals in the zone of the interior.

The installation and maintenance of radio equipment is the responsibility of the Chief Signal Officer, who, in turn, has delegated this function to the service command signal officers and their staffs of technicians and engineers. Instructions have been issued to the service command signal officers to start installation of equipment in general hospitals of their commands on receipt and approval of wiring bids from local jobbers. To assure a high professional standard of operation of controls, program planning, and distribution within local hospitals, the Reconditioning Consultants Division of The Surgeon General's Office in cooperation with the Armed Forces Radio Service of the Information and Education Division, Headquarters, A.S.F., is training personnel at the School for Personnel Service, Lexington, Virginia, and the School for Armed Forces Radio Personnel, Los Angeles, California. When trained personnel becomes available, they will be offered to

service command headquarters by the Military Personnel Division, Office of The Surgeon General, for assignment and inclusion in over-all T/O for general hospitals. The personnel assigned to hospitals for radio activities are to be not only skilled in all phases of radio activities previously referred to, but they will be fully oriented as to the philosophy of the Class 4 and Class 3 reconditioning program, the needs of these patients, and the means of meeting these needs through the use of radio.

Well-balanced weekly programs produced specifically for hospital use will be prepared and distributed to hospitals by the Armed Forces Radio Service. Packages will be interspersed with material on orientation, military education, guidance, religion, special events, music, and entertainment. In addition to the weekly packages recommended by The Surgeon General's Office, local installations will be encouraged to produce a variety of programs using local facilities, particularly calling on patients themselves to participate in all phases of the work; script writing, directing, acting, entertainment, announcing, and news commentary.

A basic manual concerning the areas of reconditioning to be covered by use of the radio, standard type of programs, and program planning is now being prepared by the Reconditioning Consultants Division for future distribution to all hospitals concerned. Installations will receive technical data on the actual operation of local radio stations. They will also receive regular mailings of ideas, script, and suggestions, all designed with an eye toward showmanship and making the day's program palatable to all.

With diversified programs going on over the hospital network, reconditioning officers believe that a long step will have been taken toward occupying the mind of the patient, thereby relieving nervous strain and anguish concerning physical disabilities and speeding him toward quicker recovery.

RECONDITIONING COURSES AT THE SCHOOL FOR PERSONNEL SERVICES

The School for Personnel Services at Lexington, Virginia, uses the facilities of Washington and Lee University. Here officers and enlisted men are trained in educational reconditioning and officers are trained in physical reconditioning. The educational reconditioning course includes orientation, guidance, educational technique, and the use of standard information and education programs as applied to returned combat casualties. The physical reconditioning course emphasizes the basic understanding of the physiology of exercise, anatomy and kinesiology, and the application of physical training to hospital patients of all types. The future physical reconditioning officer is instructed in methods of conducting games for ward pa-

tients, physically handicapped patients, and advanced groups. Instruction provides a basic understanding of the problems of convalescent training of general, medical and surgical, and neuropsychiatric cases. Special attention is paid to the specific problems of orthopedic surgery and the role of physiotherapy. Throughout the entire program of instruction, emphasis is constantly placed on the medical nature of reconditioning and the necessity of reconditioning personnel working with and for medical officers in a joint effort to aid the sick or injured soldier in his battle to overcome exhaustion, trauma, and personality destruction wrought by war. About 1,500 students have been trained in reconditioning since the opening of the Reconditioning Department of the school.

NEW RECONDITIONING MANUALS

Two War Department Technical Manuals of great importance to those engaged in reconditioning projects have been released. They are TM 8-290, "Educational Reconditioning," dated 14 December 1944, and TM 8-291, "Occupational Therapy," dated 15 December 1944. A third manual, TM 8-292, "Physical Reconditioning," is in preparation.

New Training Films and Film Bulletin Available

Dental Health, TF 8-2096. A new film which, through Disney animation and actual cases, demonstrates the importance of proper dental hygiene and care and how it may be accomplished.

The Field Hospital, FB 172. Compiled and narrated from actual combat footage, this film shows the many ways and situations in which the field hospital has actually been used and clearly demonstrates why it has frequently been called "the roving center of the Medical Department."

Care of the Sick and Injured: The NP Patient, TF 8-1428. This film, produced by the U. S. Navy and adopted by the Army, supplements and adds to TF 8-2090, "Ward Care of Psychotic Patients," but in no way duplicates it, since the approach is from a different angle. It is of value in the training of Medical Department officers and Medical Department enlisted personnel.

DISTRIBUTION OF PUBLICATIONS

Medical Department units having an interest in a publication which is not automatically distributed to them should request the originating agency to include them in the distribution formula for future publications of the same type. Any suggestions for additions, deletions, or changes in the distribution formulas of the various sections of the A.S.F. Medical Supply Catalogs should be directed to the Catalog Branch, Army Medical Purchasing Office, 52 Broadway, New York 4, New York. The Medical Supply Catalog was discussed at length in the February 1945 *Bulletin*, page 39.

OCCUPATIONAL THERAPISTS

Most patients in named general hospitals now have the benefit of modern occupational therapy. The establishment of this service in Army hospitals has been a vast undertaking. The procurement of qualified workers in civilian status has been but one of many obstacles. Courses for their indoctrination in military problems were planned. New buildings had to be designed and erected in many hospitals. Supplies and equipment have been obtained with great difficulty. The scarcity of items on the market and the demand coincident with expansion of the work have created serious deficiencies of materials needed to carry out an adequate occupational therapy program.

The great shortage of trained occupational therapists three years after entrance into the war is regrettable. While the new civilian occupational therapy courses established under the War Manpower Program will ultimately help, they did not meet the immediate personnel problem. The Army, therefore, established a War Emergency Training Course in which the selectees were college graduates with a minimum of twenty semester hours in fine, applied, or industrial arts in which there was a knowledge of three or more manual skills used in occupational therapy. A twelve-month course was designed; four months are spent in theoretical instruction in civilian schools and eight months in practical application in military hospitals.

Presently on duty are 290 occupational therapy apprentices, 45 apprentices from regular courses of civilian schools, 243 registered occupational therapists, a total of 578 on duty.

Two hundred and twenty-four additional students are now receiving their four months' training course in civilian schools. Enrollment for the final two courses on 1 June and 1 July is 122 which will increase the additional students to 346. Each class has been filled to capacity. There were many more applicants for the last courses than could be admitted. These were referred to schools to take the regular course instead of the war emergency one.

The benefits of the long-range program to provide properly trained occupational therapy personnel will soon be felt in Army hospitals in the zone of the interior.

MONTHLY MEDICAL MEETING

At the monthly meeting of medical officers, Army Medical Center, Washington, D. C., 15 March, Major General Norman T. Kirk, The Surgeon General, discussed "Over-all Aspect of Trip Through Pacific Ocean Area." Brigadier General James S. Simmons, chief, Preventive Medicine Service, Surgeon General's Office, discussed "Preventive Medicine in Pacific Ocean Area."

THE USE OF OPERATING ROOM LAMPS

Instances have been reported to The Surgeon General where accidents, which might have resulted in serious injury to surgeon or patient, have occurred in the use of various types of operating lamps in Army hospitals. To avoid such unfortunate incidents, commanding officers of Army hospitals, operating surgeons, and medical supply officers should take every precaution to assure that such lamps are properly and safely installed, that all accessory equipment is of a type authorized for use, and that light bulbs of suitable type and wattage are installed.

All operating lights are designed to use a specific type and wattage lamp bulb. The use of incorrect types of lower than specified wattage results in inadequate illumination; a bulb of wattage higher than that specified may result in serious mechanical and electrical breakdowns. Because of the extreme amount of heat generated, the lens or other glass parts of the lamps may break and fall into operative fields. Continued use of high wattage bulbs will cause the electrical wiring and other electrical parts to deteriorate and, in time, will result in short circuits with attendant spark and fire hazards.

Army Service Forces Catalog, MED 3, lists by item number and nomenclature the various types of operating room lamps which are standard for issue in the Army. The catalog also lists by item number, nomenclature, voltage, wattage, and type, the correct bulbs for use in each model of lamp. To avoid possible injury to operating surgeons and fatalities to patients, extreme care must be exercised in requisitioning bulbs required for operating room lamps, giving item number, voltage, wattage, and type number of lamp.

The practice of using portable or mobile operating lamps as sources of illumination in photographic procedures should be very carefully supervised. The interchange of lamp bulbs by photographers or others, in order to secure such illumination, should be prohibited.

A SIMPLE DRESSING FOR GRANULATING WOUNDS

The use of petrolatum gauze to cover granulating wounds unsuitable for skin grafting or secondary closure is objectionable for several reasons: (1) From such wounds the purulent drainage is discharged around the petrolatum gauze pack and comes in contact with normal skin. The petrolatum keeps the skin about the edge of the wound soft and makes it susceptible to irritation from the constant flow of purulent drainage. This leads to maceration and frequently to the development of small superficial furuncles. (2) Granulation tissue piles up beneath an impervious dressing, especially in areas where it is difficult to maintain adequate pressure on the wound. (3)

Even though a number of layers of petrolatum gauze are laid over a granulating wound, the petrolatum from the gauze tends to liquefy and soak into the dry dressings above. Consequently, when dressings are changed, it is found that the petrolatum gauze has become rather firmly adherent to the granulation tissue. In spite of utmost gentleness in its removal, extensive capillary bleeding is started.

To overcome these difficulties, reports Lieut. Colonel Willis J. Potts, M.C., a simple dressing was made of ordinary mosquito netting impregnated with a mixture of paraffin and petrolatum. Mosquito netting was chosen because the fine mesh of ordinary surgical gauze impregnated with any mixture of paraffin and petrolatum is completely sealed and does not allow adequate drainage. Material with a mesh larger than that of netting allows granulation tissue to grow through too readily. It was found that 75 percent paraffin and 25 percent petrolatum made the most acceptable mixture. Mosquito netting impregnated with paraffin alone is too stiff and unyielding to conform easily to the contour of irregular areas to be dressed. The melting point of the mixture is high enough to prevent liquefaction under ordinary conditions. For convenience, we called the dressing "paraline gauze."

In preparing the dressing, mosquito netting is cut into rectangular pieces 4 by 6 inches and sterilized in an autoclave. The mixture of paraffin and petrolatum is put in a shallow pan over a Coleman stove and brought to smoking heat. A sterile table is set up next to the stove. With a sterile forceps in each hand, the pieces of netting are dipped one at a time, given a quick shake to open the meshes in the material, and laid on sterile towels. Fifty to one hundred pieces, depending on demand, are wrapped in sterile towels and stored for delivery to the surgical wards where they are transferred to sterile covered pans as needed. For use in individual cases in the operating room, lesser numbers of pieces are wrapped in sterile towels. This dressing cannot be autoclaved after preparation because the heat melts the paraffin-petrolatum out of the netting.

"Paraline gauze," as a dressing for granulating wounds, has the advantages of ordinary petrolatum gauze without the disadvantages. As a covering for skin grafts, it does not stick to the graft; it keeps the graft dry by allowing any drainage at the edges of the graft to soak through its meshes into the fluff gauze dressing. This dressing has been used with satisfaction for six months at an evacuation hospital in a tropical zone.

Army Medical Museum Seminars.—At the seminar, Army Medical Museum, Washington, D. C., 10 March, Major Edmund P. Fowler, Jr., M.C., A.A.F., discussed "The Pathology of the Temporal Bone and Its Application to Aviation Medicine"; at the seminar 17 March Dr. James Kernoahan, of the Mayo Clinic, Rochester, Minnesota, discussed "The Pathology of Spinal Cord Tumors."

WAC GENERAL HOSPITAL COMPANIES

The answer to the call for enlisted women for service in Army general hospitals in the zone of the interior has been gratifying. The governors of the states have cooperated in every way, and the coordinated effort of all who worked to make this recruiting drive successful has been rewarded in a response of American women which will reach the goal long before anticipated. As a result the training facilities at Ft. Oglethorpe, Georgia, are being expanded to take care of large increments each week. Lieut. Col. Elizabeth Strayhorn, commandant of the Third WAC Training Center, and her staff, all veteran training center officers, are responsible for the housing and feeding of these women during the twelve weeks at the Center, and they conduct the basic training and the medical clerk's course. Nineteen percent of the women are trained as clerks in a special course which emphasizes medical clerical work. The medical and surgical technician's course, conducted by Lieut. Col. James M. Dunn and a staff of medical officers, nurses, enlisted men, and enlisted women, is six weeks in length. On completion of this course, trainees report to the general hospital where assigned for four weeks of on-the-job training. The first instructors in the medical and surgical section to report at Ft. Oglethorpe were formerly at the Medical Department Enlisted Training School, Lawson General Hospital; other officers are reporting in after overseas assignments, and enlisted women are being selected on graduation from the MDETSs at the Beaumont, Brooke, Fitzsimons, and Wakeman General Hospitals.



**X-RAY RECORD CART
WITH VIEWING BOX**

An x-ray record cart with illuminated viewing box attached has been designed by Lieut. Colonel Vernon L. Hart, M.C. Thus, ward walks, especially on an orthopedic ward, are made more thorough and in less time. At other times the cart with x-ray and clinical records remains in the office of the medical officer. The drawer for the clinical records has lock and keys.

DIETITIANS NEEDED

Acute shortages exist in Medical Department dietitians to care for the needs of wounded men. As of 17 March casualties were being returned from overseas at a rate of 1,200 a day. In anticipation of the increased patient load, the War Department authorized 2,000 dietitians, whose duty is to plan menus and supervise the service of food for the sick and wounded, requisition all food supplies and equipment, assist in supervision of mess sanitation, maintain records, and instruct special diet patients. Some dietitians have been serving in forward hospitals near combat zones; others serve on hospital ships. Of this goal, 1,500 had received commissions and 200 more were in training, leaving a net shortage of 300. Qualifications for commission as a dietitian include a degree from an approved college with a major in either foods and nutrition or institutional management, and completion of either a dietitian's training course approved by The Surgeon General or two years of experience in an approved hospital.



Student dietitians returning to Walter Reed General Hospital for duty after attending class at the Army Medical School, which appears in the background. Signal Corps photograph.

WALTER REED HOSPITAL WACS RECEIVE MERIT PLAQUE

The oldest WAC hospital unit in the Army has been awarded the Meritorious Service Unit Plaque for superior performance and devotion to duty in the care and treatment of sick and wounded war veterans at Walter Reed General Hospital. Major General Shelley U. Marietta, commandant of the Army Medical Center, made the presentation. The award made for the period from 1 July to 31 December 1944, the first full period after this award was authorized, is the first award of its kind to a WAC hospital detachment.

The unit cited includes laboratory, x-ray, medical, and surgical technicians, ward clerks and orderlies, medical stenographers, and personnel working in the diet kitchens. The unit has been on duty at Walter Reed General Hospital and the Army Medical Center since June 1943. Members of this detachment were the first WACs assigned to an Army general hospital. Their work as technicians and as assistants on the wards, in the offices, and in the operating rooms of the large Army Medical Center was an example by which the Army determined to recruit and train large numbers of other WAC personnel for work in Army general hospitals.

The current recruiting effort is for 103 WAC medical units, each consisting of 100 enlisted women and one officer, for assignment to sixty of the Army's general hospitals.

UNIFORM FOR HOSPITAL TECHNICIANS

A new dress for Women's Army Corps hospital technicians has been designed in the Office of The Quartermaster General. The new, short-sleeved dress is of rose-beige cotton print resembling chambray. It is tailored in one piece, fastens down the front with buttons to match the dress shade, and has a buttoned belt. The collar is of a fold-back design and insignia will be worn on it, the "U.S." on the right and the caduceus of the Medical Department on the left tab. There are two large pockets on the skirt and a small breast pocket on the left. The new dress, which replaces the blue cotton crepe uniform, is to be worn by enlisted women only while on duty in the hospital, and will not be worn by officers. Each technician will be issued nine of these easily laundered dresses.

WOMEN MEDICAL OFFICERS

There were, as of 28 February, 74 women medical officers serving in the Army. Of this number four are majors, thirty-six are captains, and thirty-four are first lieutenants. They have been certified as internists, neuropsychiatrists, obstetricians, gynecologists, pathologists, radiologists, and anesthetists, and the Army has given them assignments in line with their specialties at general, regional, and station hospitals as well as at the two W.A.C. training centers. Seventeen of these women medical officers were then serving overseas.

PROGRAM FOR DEAFENED PATIENTS

More than 3,000 defective hearing cases have been processed at the deaf centers since their inception. This service for the deafened was begun on 28 May 1943, when The Surgeon General designated three general hospitals as aural rehabilitation centers for the treatment of the deafened. They were Hoff General Hospital, Santa Barbara, California; Walter Reed General Hospital, Washington, D. C.; and Borden General Hospital, Chickasha, Oklahoma. The program at Walter Reed was transferred to Deshon General Hospital, Butler, Pennsylvania, on 1 November 1943.

Cases of defective hearing should be transferred to one of the three hospitals above in accordance with War Department Circular No. 81, dated 23 February 1944, section IV, paragraph 2 of which reads as follows:

Every case in which the impairment of hearing shows a true loss in the better ear of 30 decibels of hearing within the conversational range (256-2048 db) * * * in a case of stationary or progressive deafness free from acute inflammatory aural disease, will be transferred in accordance with existing regulations to a hospital designated for the rehabilitation of the deaf at the earliest practicable date.

These cases should be transferred promptly to one of the centers regardless of whether or not their deafness was an incident of service, aggravated by service, or existed prior to entrance into service.

Patients are retained at the hospital for two months during which time they are given an intensive course in lip reading. If necessary, speech correction and acoustic training are provided during the two months. The amount of instruction is based on the needs of the individual case. A hearing aid is issued by the Government if the patient can be benefited. It is requested that patients be ordered to one of the three above-mentioned hospitals with the knowledge of the two months' stay.

There is nothing new about the problems encountered in patients who are deafened or who have had severe damage to their acoustic mechanism, but there is, it is believed, something new about the Army's aural rehabilitation program that is at present well organized in the three centers. The physician, the engineer, the psychologist, and the teacher are, for the first time so far as we know, collaborating on a large-scale approach to this problem. We believe that there is considerable significance in this program for the future and that the treatment of deafness in civilian life will be benefited by their use of this program if adopted. We feel that the Army type of program, with its integrated collection of trained personnel, clinics, laboratories, electro-acoustical equipment, and classrooms under one roof, will be valuable for use in the metropolitan centers for civilians after the war.

MAXILLOFACIAL INJURIES

A survey of the North African and Sicilian campaigns shows that of the total admissions to hospitals 0.5 percent were for maxillofacial injuries. There were 342 maxillofacial cases, and 145 or 42 percent of the total number were the result of battle casualties, and 197 or 58 percent were accidental. The incidence of maxillofacial injuries as compared to all battle casualties was about 2.2 percent. Two factors may be responsible for the lower rate in this war than in the last World War: (1) there has been little or no static trench warfare wherein the soldier must expose his head to fire; (2) the velocity of modern missiles causes a greater degree of mortality when the face or head is hit. In the 342 cases studied in the hospitals there were no deaths due primarily to battle-incurred maxillofacial injury. The history of the European Theater reveals that, from 1 September to 31 December 1944, maxillofacial injuries average about 5.9 percent of all wounds in the theater and that about 3.4 percent of the total deaths result from this type of wound.

MANAGEMENT OF APHASIA

An increasing number of patients with organic language disorders are coming into the military hospitals. The majority of these disorders have resulted from severe head injury encountered in combat and have, in addition to an aphasia, other associated neurological defects of a motor or sensory nature and concomitant emotional, intellectual, or personality changes. Thus the speech defect resolves itself into one of several defects present in the brain-injured patient.

The speech deficit in all organic problems tends spontaneously to improve in the first several months following trauma or vascular or inflammatory disease of the brain. Much can be done, however, in speeding this up and making sure, by speech training, that the progress made is the correct type. Much can be done, also, to influence the individual's psychological reaction to his speech and other deficits by skilled management of the language disorder. This care should begin early in the patient's rehabilitation. Language retraining goes along with other treatment measures. Thus, during the neurosurgical phase of the patient's illness the aphasic is studied and training begun, and when surgical measures are concluded the patient moves along to the neurological section where treatment of all residual defects is continued until maximum hospital benefit is attained.

Aphasic patients thus receive the collaborative attention of the neurosurgeon and neurologist, the latter being charged with the responsibility for the study of the language defect. The services of the clinical psychologist, also, are promptly enlisted to obtain certain psychological test data. The Clinical Psychology Branch of The Adjutant General's Office has

made every effort to assign to these centers psychologists who have special knowledge of language pathology; also speech correctionists, either enlisted or civilian, who will carry out more specific details of speech training under the neurologist's supervision.

All aphasic patients are cared for in each of the neurological and neurosurgical centers. This method of management of the aphasic problems was deemed especially desirable since it will keep the units small, permit early specialized attention, and at the same time avoid any material lengthening of the patient's over-all stay in the hospital by virtue of his speech defect alone. Individuals who fail to improve after a reasonable period of specialized training may receive further training through the Veterans' Administration facilities which now also are giving the aphasic language disorders specialized attention.

Maxillofacial Team.—The maxillofacial team is authorized one major (oral surgeon) and one dental laboratory technician (067—T/4). The equipment consists of one maxillofacial kit, one dental officer's kit, and one private's dental kit.



Horses and mules play valuable transport roles in war theaters. The horse shown here has been fitted with a regulation gas mask by medical trainees of Fort Lewis Army Service Forces training center. Photograph by *Fort Lewis Sentinel*.

HIDDEN EXCESSES OF SUPPLIES

More than 1,250,000 excess artificial teeth have been returned to medical depots by posts, camps, and stations. This has made possible the cancellation of a number of contracts, for the supply service now has enough of this item to fulfill all requirements for 1945 and 1946. This is an indication that the return of excesses must be vigorously pushed, for the artificial teeth had to be called in specifically. It is an indication, also, that there is hoarding in the supply warehouses, dental clinics, and pharmacies of posts, camps, and stations. Excesses of quinine, alcohol, dental burs, and pentothal sodium have recently been uncovered and returned to depots. This type of hoarding, which resembles the squirrel-like behavior of an overly prudent housewife, creates an artificial scarcity that induces others to hoard; in addition, it causes the supply services to relieve the seeming scarcity by letting additional contracts. Hence, in some cases, we are buying items which are in fact surplus to our needs.

A revision of TM 38-220, which soon will appear, extends supply control to the using agencies. Formerly, it went no farther than the post medical supply officer. It is hoped that this change will curtail hoarding and uncover local excesses.

USE OF V-BOARD DISCONTINUED

Reports from several theaters have established that V-Board does not afford sufficient protection for medical supplies shipped overseas. It is not sufficiently rigid to withstand the numerous rough handlings at ports and on beaches. A slight break in the V-Board, often caused by the shifting of cargo, admits dampness and water, thus resulting in the disintegration of the container and the spoilage of its contents. Manufacturers will no longer pack medical supplies in V-Board, and supplies in zone-of-the-interior depots will be over-packed (either crated or boxed) before shipment overseas. Thus, so far as medical supplies are concerned, the use of V-Board is ended.

STOCK CONTROL OF EXPENDABLE SUPPLIES

Technical Manual (TM 38-220), "Stock Control Manual for Posts, Camps, and Stations," is currently being revised. The definition of "organization" has been broadened to include consuming agencies within hospitals that draw matériel and supplies direct from station supply officers. This revision was proposed to provide for the establishment of authorized allowances of expendable supplies for wards, departments, and other consuming agencies within fixed hospitals and also to authorize depot stock control liaison officers to consult with responsible officers of the consuming agencies and assist in

coordinating the stock requirements for expendable supplies, the allowance of which should not be in excess of an estimated or computed requirement for operation during any one issue period as established by the station commander. Stock control has been extended to wards, departments, and other agencies within fixed hospitals.

NEW ITEMS OF DENTAL EQUIPMENT

The following dental items have recently been added to the standard list of equipment and supplies:

Disk, carborundum, separating, $\frac{3}{4}$ inch (5217400).

Stone, artificial, 35 lb. (5577015).

Engine, foot, electric conversion unit (added to M.D. Chest No. 60) (5259035).

Trimmer, denture 12: A trimmer mounted on a mandrel for use with straight handpiece or lathe (5644020).

Trimmer, model portable, dental, 110 V, 60 C: This item has limited distribution to large dental laboratories in the United States (5644055).

Lathe, dental, 110 V, 60 C, has been added to M.D. Chest No. 62, replacing Item No. 9507000, Lathe, hand, modified (5392009).

The alcohol burner in the sterilizer (M.D. Chest No. 60) was replaced by a gasoline stove assembly, replacement Item No. 9R10350.

Items in Process of Development

A portable light for use with the M.D. Chest No. 60 has been developed, and a notice of its availability will appear in a future issue of *The Bulletin*.



U. S. Army "medics" push an assault boat filled with medical supplies to a stream beyond which lie wounded American soldiers. Bettendorf, Luxembourg. Signal Corps photograph.

DENTAL FILM STRIPS

A series of new film strips are being developed on various phases of dentistry through the cooperation of the Dental and Training Divisions, Surgeon General's Office, the Army Medical Museum, and the facilities of the Army Signal Corps. Their release will be announced at a future date. The films are intended to be another medium for study and review by the officers of the Dental Corps at all Army installations. One of the first films to be released will cover diseases of the mouth, and it will be in color. The etiology and pathology of each condition or disease will be thoroughly discussed in a separate booklet to be distributed with the film. The majority of the film strips will be in black and white. Other subjects to be covered will be dental anomalies, dental caries, periodontal diseases and infections, odontogenic cysts and tumors, and tumors of the oral cavity. The films will provide a source of additional timely information to many dental officers and will afford an opportunity for group meetings and discussion for those who wish to review these phases of dentistry.

ASSIGNMENT OF M.A.C. OFFICERS

The proper assignment of Medical Department enlisted men after direct appointment as officers in the Medical Administrative Corps is of utmost importance. While there is no specific War Department order prohibiting their assignment to the same unit in which they served as enlisted men, it is generally not advisable to do so for obvious reasons. As a general rule they should be assigned to the same type of medical unit in which they served as enlisted men so that maximum advantage can be taken of their previous experience. There is no objection to assignment to another similar unit within a division. For example, an enlisted man assigned to Co. A of a divisional medical battalion after receiving his commission could be assigned to Co. B of that battalion. Recommendations for proper assignment should accompany application for commission. Any instructions by theater commanders to the contrary of course will govern.

LAUNDRY SERVICE FOR ENLISTED PATIENTS

The revised AR 30-2135, dated 12 January 1945, authorizes laundry and dry cleaning service, at Government expense, for all articles of personal apparel belonging to enlisted patients of Army hospitals. Provision of this service will obviate the necessity of storing the soiled and contaminated effects of enlisted patients in the restricted storage space of hospital baggage rooms and will provide a much-deserved convenience to patients.

MODIFICATION OF STANDARD HISTOLOGIC PARAFFINS

It has been reported that certain lots of the standard histologic paraffins are excessively brittle, crumble readily, and contain air bubbles after heating. These difficulties can be corrected by adding about 1 part of beeswax (A.S.F. Medical Supply Catalog Item 1493000) to 8 to 10 parts of the standard paraffin. This ratio may have to be modified according to the needs of a particular lot of paraffin.

FATAL INTRACRANIAL COMPLICATIONS OF TOOTH EXTRACTION*

Relatively few case reports have been published of intracranial complications after routine tooth extraction. The author reviews in detail 27 fatal cases received over the years by the Army Institute of Pathology, 13 of them since Pearl Harbor. The reasons for extraction were periapical abscess, 6; caries, 3; impaction, 2; toothache, "painful jaw," malposition of teeth, painful eruption, periodontoclasia, "edema of gums," and chronic osteomyelitis, 1 each; and not specified, 9. Local infiltration anesthesia with procaine was used in 6 cases, conduction in 4, and the mode of anesthesia is not known in the other seventeen. Disregarding a certain degree of overlap in the pathologic findings, the cases fall into the following categories: subdural empyema, 1; subdural empyema and brain abscess, 2; leptomeningitis, 2; leptomeningitis and brain abscess, 2; suppurative encephalitis and ependymitis, 1; brain abscess, 8; sinus thrombosis, 11.

The extractions are believed to have initiated or precipitated the infective process in virtually all of the cases. Cases in which teeth were extracted in order to drain an already advancing osteomyelitis of the jaw were not included in this series.

The mouth was in poor hygienic condition in only 8 of the 27 cases.

One tooth was extracted in 18 of the cases, an observation which indicates that, in this series at least, the danger of fatal

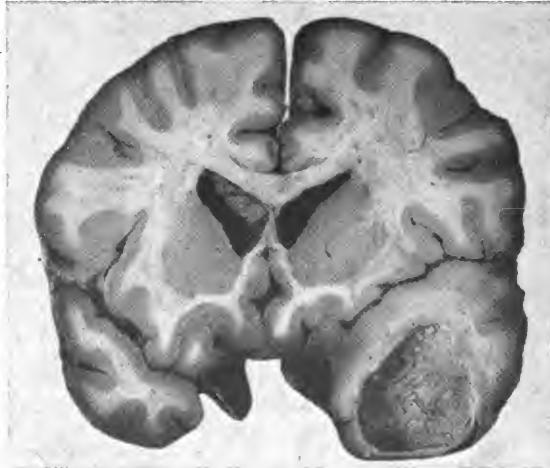


FIGURE 1. Abscess of right temporal lobe following spread of infection through the base of the skull. The abscess ruptured into the inferior horn of the lateral ventricle. (Army Medical Museum negative No. 76729)

*Abstract of a paper by Captain Webb Haymaker, M.C., A.U.S., on "Fatal Infections of the Central Nervous System and Meninges after Tooth Extraction," published in *The American Journal of Orthodontics and Oral Surgery*, March 1945.

intracranial complication lies elsewhere than in multiple extraction. In cases in which the greatest number of teeth had been extracted there was no evidence that bacteremia ensued. Upper teeth were removed in about the same number of cases as lower teeth. A review of literature reveals that fatal complications of dental infection of the lower jaw are virtually twice as frequent as those of the upper jaw, and that fatal infections of the left side outweigh those of the right side by 3 to 2.

Of teeth extracted, the molars predominated; only molars had been extracted in cases in which cavernous sinus thrombosis ensued (except for one in which a bicuspid was also removed). The tendency for infection in the vicinity of molar teeth to lead to intracranial complication doubtless is to be ascribed to anatomic relations: not having free access to the oral cavity or to the exterior as in the anterior part of the jaw, the pus tends to collect between the muscles of mastication and to spread rapidly upward in fascial planes. In some of the cases the collection of pus at the base of the skull was so deeply situated that its presence was not recognized nor was it reached by surgical means. Spread of the infective organism to the intracranial cavity by way of the general circulation occurred in 10 of the 27 cases. In 7 of these there was brain abscess. Direct spread of the infective process to the intracranial cavity occurred in 18 cases, in 8 of which there was suppurative cellulitis which spread to the base of the skull, producing osteomyelitis of the greater wing of the sphenoid bone. Intra-orbital abscess occurred in 6 instances, brain abscess in 7, and cavernous sinus thrombosis, 9.

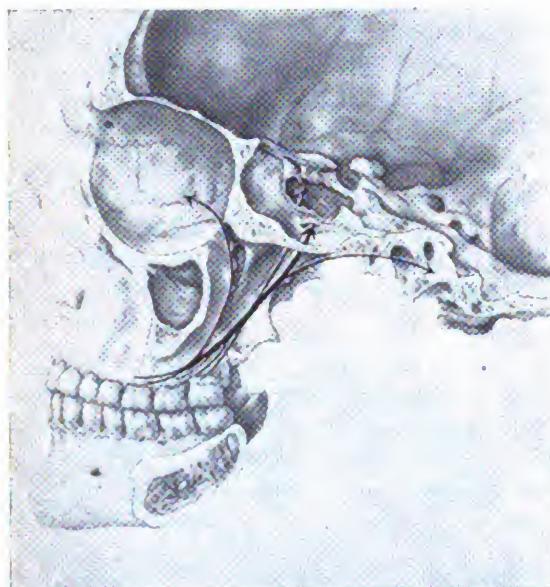


FIGURE 2. Pathways through which infections ascend from the jaw to the intracranial cavity. The most frequent site of penetration of the base of the skull by infections complicating tooth extraction is the greater wing of the sphenoid in the vicinity of the foramen ovale (indicated by the thicker arrow). The next most frequent cranial structures involved are the sphenoidal sinus and the overlying sella turcica. The infective organism may reach the sphenoidal sinus directly (as indicated by the arrow within the exposed sphenoidal sinus) or by contiguity from the greater wing of the sphenoid bone. Another route of spread is through the petrous part of the temporal bone. In some cases the infective organism reaches the retrobulbar tissues in the manner indicated, and subsequently may enter the intracranial cavity via ophthalmic veins or by direct spread through the skull or its orifices. (Army Medical Museum negative No. 81313)

ANNUAL REPORTS

The Surgeon General is receiving, under the provisions of AR 40-1005, many excellent annual reports which provide an over-all view of the widespread medical activities. Great care and interest have attended the preparation of many of the reports, which are of scientific and historic worth. Since it is not feasible at this time to acknowledge adequately and commend all units that have prepared exceptional reports, brief acknowledgment is made here.

The majority of the reports pass through the office of the theater surgeon where they provide his staff with a review of the work of the units and furnish source material to the theater's medical historical officer. It is evident that these reports are carefully reviewed in the headquarters of the theater and that necessary action is often taken on the recommendations before they are forwarded to the War Department.

Similar use is made of the reports in the Office of The Surgeon General where the Historical Division assumes the responsibility for their immediate and future use. They are reviewed promptly and then made available to the professional and administrative divisions. Since some reports are of interest to several divisions, care is required in scheduling the circulation of them. They are sent first to the division most concerned. Reports that are of particular interest to several divisions are separated into sections and circulated by chapters and pages. After they are returned from circulation, they are available for use by divisions requesting them. Such requests are received frequently not only from divisions of the S.G.O. but also from the Army Ground Forces, Army Air Forces, and other War Department agencies.

These reports provide also a large reservoir of factual data needed to compile the history of the Army medical activities. To make this material readily available, they are evaluated, abstracted, and indexed. The evaluation enables the Historical Division to select promptly the best reports of each type of unit when such are required. The abstract shows at a glance the general character of the report, its value, and location and mission of the unit. The index cards are a key to those subjects that are discussed especially well. This file provides a ready reference to all medico-military subjects. Since well-selected photographs, maps, and overlays will embellish the history, it is desired that additional material of this nature be submitted with the reports, subject to the approval of the commanding generals.

Annual reports serve, therefore, the immediate and vital needs of the Historical Division as well as of the various services and divisions of the S.G.O. The entire Medical Department historical program depends in large measure on the quality of the reports sent in from the field. One especially well-qualified theater historian wrote recently: "These annual

reports are among the most important records of the medical service and constitute the principal basis of the history of the Medical Department in this war."

In this connection, the following extracts from the letter of President Roosevelt of 25 January 1944 to the Director of the Bureau of the Budget, relative to the Federal history program are of interest:

* * * I am personally very much interested in this study of administration and I hope that each department and agency head will see to it that the story of its agency in wartime is systematically developed. The best way to advance our knowledge of administration is through the study of actual experience. Those agencies which have not yet established units to deal with the recording of the administrative experience should do so.

It is a well established practice for officials to make a public accounting of their stewardship. Soon after the war each agency should have ready a good final report that will sum up both what was accomplished and how the job was done. * * * There is much to be gained from our wartime experience for improving administration in the future. I feel sure that a careful recording of this experience not only will help to win the war but also will serve the needs of the post-war era.

In addition to the reports covering the activities for each calendar year, it is desired that each unit or installation that is relieved for any reason from duty in a theater during a calendar year prepare and forward in the usual way full factual reports covering that period. These reports should be similar in outline and contents to the annual reports. This is provided for by paragraph 6, AR 40-1005, that states that responsible officers "will forward to The Surgeon General through military channels after the close of each calendar year, or for a shorter period when so directed, a report of the activities during the period."

DENTAL PRISONERS OF WAR

The following officers of the Army Dental Corps have been reported released from prison camps in the Philippine Islands: Captain Eugene Curtis Burson, O-354804; Captain Claude L. Daniel, O-400963; Lieut. Col. Albert Fields, O-11505; Captain Garnet Paul Francis, O-384556; Captain Denton J. Rees, O-331514.

Prosthetic Laboratory.—Dental laboratory facilities in the zone of communications are provided by a dental prosthetic detachment (fixed), with one major and one captain or first lieutenant (prosthodontists), and with six laboratory technicians (067's in grades T/3, T/4, and T/5). Supplies are authorized according to Medical Department Equipment List 9733003. Additional dental prosthetic service in theaters of operations is provided by a dental prosthetic detachment (mobile) with one captain or first lieutenant (prosthodontist) and three dental laboratory technicians (067's in grades T/3, T/4, and T/5). Each dental prosthetic detachment (mobile) has one mobile dental laboratory unit and one $\frac{1}{4}$ -ton trailer, and one power unit PE 75—().

HEALTH OF THE PRISONERS OF WAR

The number of prisoners of war in the continental United States more than doubled during 1944. As of 1 February 1945 the War Department announced that there were nearly 360,000 prisoners of war held in this country of whom about 305,000 were Germans, more than 50,000 Italians, and 2,800 Japanese. Even though two German hospitals staffed by German personnel are located in this country, prisoners of war have constituted a considerable load on the Medical Department of the Army in this country. The quality of the medical care given them is undoubtedly reflected in the fact that health conditions among them were most satisfactory during 1944.

Morbidity among prisoners of war during 1944 was at the very low rate of 580 per year per thousand strength, or about 10 percent below that for U. S. Army personnel in this country. The highest morbidity rates were recorded among German prisoners of war (595 per thousand), with Italian prisoners including personnel of Italian service units next highest (523 per thousand), and with Japanese prisoners reporting the lowest morbidity (474 per thousand).

The very favorable morbidity of prisoners of war was chiefly due to lower admission rates from respiratory causes during the first quarter of the year, when such diseases are normally at their peak. During the summer, spring, and fall months there was relatively little difference in admission rates between prisoners of war and U. S. Army personnel. For the year as a whole, the admission rate from disease for prisoners of war was about 15 percent lower than for U. S. troops. However, the injury admission rate for prisoners of war was about 50 percent higher than for U. S. Army personnel. This higher injury admission rate was especially characteristic of German prisoners and of Italian service units and reflected, in large part, their utilization on work details involving greater exposure to relatively minor injuries as well as very vigorous participation in athletics.

Morbidity from colds, influenza, etc., among prisoners of war was at a very low level in 1944, with admission rates only about half of those for U. S. troops. To some extent, this very much more favorable experience reflected the location of prisoner-of-war camps predominantly in the southern states, where most of the prisoners of war in the United States are working. In these areas morbidity from respiratory causes is relatively lower. Prisoners of war also experienced exceptionally low morbidity from pneumonia, measles, mumps, and scarlet fever. The proportion of pneumonia cases which were diagnosed as atypical was about the same for prisoners of war as for U. S. troops (i. e., about two-thirds).

Higher morbidity than for U. S. Army personnel was reported for prisoners of war from malaria, diphtheria, infectious

hepatitis, and tuberculosis. The admission rate from malaria, representing almost entirely cases acquired outside this country, accounted for about 10 percent of the morbidity of such personnel. Italian prisoners had a materially higher admission rate for malaria than German prisoners. The morbidity of prisoners of war from diphtheria, infectious hepatitis, and tuberculosis has been about double that of U. S. Army personnel.

The death rate among prisoners of war was extremely low, at 0.8 per year per thousand, or less than a third of the corresponding mortality rate for U. S. Army personnel in this country. It should be borne in mind, however, that more than half of the deaths among U. S. Army personnel were due to aviation accidents and about a quarter were due to automobile accidents, both being hazards to which prisoners of war were obviously not exposed to a comparable extent.

MICROFILM PROJECTOR FOR ARMY HOSPITALS

A projector has been made available on the Tables of Equipment of all hospital units with a bed capacity of 250 or more in the zone of the interior and overseas. This projector is suitable for showing slides of 2" x 2" size, including Kodachrome slides, and 35-mm. film strips. In addition, another lens, of 3-inch focal length, is authorized for each projector. This lens gives good projection for 35-mm. film at short focal distances and permits the apparatus to be used as a microfilm reader. The projector (PH 222) is listed under the Signal Section of T/O and E 8-560 for station hospitals, published 28 October 1944, and T/O and E 8-550 for general hospitals, published 3 July 1944. Lens PH-441, one per projector, (non-standard) is authorized for hospital units of 250 or more beds in T/O and E 8-560 and in a change of T/O an E-550, published 28 December 1944.

This projector should make it possible for these hospitals to use the microfilm facilities of the Army Medical Library, Washington, D. C., from which they may obtain promptly medical references that they may need for investigation or study. The microfilm service of the Army Medical Library was described in the August 1944 *Bulletin*.

The service is set up to provide additional medical literature for members of the armed forces overseas and as an aid to those engaged in scientific investigation both overseas and in this country. Single reference articles from journals or publications are microfilmed on request. Requests for this service should be in duplicate and not more than fifteen references should be requested at one time in order to expedite filming. References should be numbered on the request sheet and arranged alphabetically under the title of publication. The reference should be given in this manner: title of publication, volume, complete pagination and year, author's full name, and

title of article. In addition to this service a list of complete medical journals is microfilmed and sent regularly, upon request, to installations in various overseas theaters. These journals are sent only to overseas installations and the South American area is not included in this distribution. Published books can also be microfilmed, but because of the technical difficulties and copyright problems involved this is done only in exceptional cases.

EXCESSIVE HUMIDITY WHILE DEVELOPING X-RAY FILMS

The following material will assist in the proper development of x-ray films under unsatisfactory conditions of humidity and temperature:

1. Where temperature and humidity cannot be controlled by using temperature control apparatus, the addition of sodium sulfate to the developing solution, and, where temperatures are unusually high, to the fixing bath also, will be of additional assistance. Assuming that a fairly constant temperature range exists, for example, from 78° to 80° F., sodium sulfate should be added to the developing solution in the proportion of 50 gm. of sodium sulfate per liter of developer. Developing time at these temperatures should be from three to four minutes. If sodium sulfate is employed in developing and fixing solutions, it is necessary that an intermediate hardening bath also be employed. Such baths are composed of chrome alum and sodium sulfate

	90° F.	100° F.	110° F.
Developer	75	150	200
Intermediate hardening bath	None	50	None. Make up to 3 gallons instead of 5.
Time in developer	3 min.	2 min.	1 min.
Time in intermediate hardening bath	3 min.	3 min.	3 min.
Time in fixing bath	5-10 min.	5-10 min.	5-10 min.

and may be procured commercially. In using intermediate hardening baths, after films have been developed, they should be given very rapid rinse in water and transferred to intermediate hardening bath to remain from two to three minutes, with constant agitation to the bath. The films should again be rinsed and placed in final fixing bath for about ten minutes after which they may be safely washed in running water for fifteen minutes. Such intermediate hardening baths must be changed every twenty-four hours, with or without use, as chrome alum breaks down rapidly at high temperatures in solution. For temperatures higher than those quoted, it will also be necessary to add sodium sulfate to the intermediate hardening baths, if temperatures reach 100° F. or over, at the rate of 50 gm. per liter. At temperatures of 110°,

the solutions will be so saturated with sulfate that if the temperature drops as little as 5° or 10°, crystallization will occur and the temperature must be restored to the original in order that such crystallization may dissolve. The table shows degrees and temperature Fahrenheit and recommended quantities of sodium sulfate (desiccated) necessary per liter of solution, as well as recommended time of development at varied temperatures.

2. Many times cassettes have been ruined because of high temperatures and excessively high relative humidity, which causes the gelatin emulsion of the x-ray films to absorb moisture and results in the gluing of the screens together. To prevent this, films should be removed from the original packing and placed in cassettes only at the time of use. The present packing of x-ray films is adequate protection against both heat and humidity. Cassettes when not in use should be kept open to keep the screens as dry as possible. If possible, they should be stored in a wooden box containing a dehydrating substance. Some units have reported placing an incandescent lamp in a closed box, and by the heat generated from the lamp a dry atmosphere has been maintained.

AWARD OF LEGION OF MERIT

The War Department has announced the award of the Legion of Merit to the following Medical Department personnel:

LIEUT. COLONEL ROLLAND B. SIGAFOOS, M. C.: For exceptionally meritorious conduct in the performance of outstanding services as senior medical instructor of a training center for the Chinese Army in India from 30 November 1942 until 13 August 1943. With inadequate assistance, he organized the medical rehabilitation of the Chinese troops who had escaped in May 1942. With untiring efforts he organized all medical units from the battalion to include divisional echelons. His tables of organization have stood the test of battle. Starting with the most elementary subjects in the school of a soldier, he trained hundreds of men of these Chinese units all through the technical and tactical subjects. His work assisted in establishing and maintaining good relations between Chinese and Americans.

MAJOR CHAMP LYONS, M. C., of Mobile, Alabama: He initiated and guided the methods by which the new and potent agent, penicillin, has been utilized in the treatment of the seriously wounded. From the most forward mobile hospitals of Italy to the large general hospitals of the interior, he has personally operated on and studied the treatment of the wounded, instructing his seniors and subordinates alike in a change of surgical procedures which is productive of better results. Lives and limbs of soldiers have been saved, and the disability and deformity of wounds materially reduced. His professional judgment, combining a basic knowledge of the science of bacteriology with skill and experience in practical surgery, has cast new light on the problem of wound surgery. The example he has set is an inspiration to all surgeons in the service.

. Award to Veterinary Unit.—The Commanding General, Headquarters, Seventh Service Command, Omaha, on 15 February, awarded the Meritorious Service Unit Plaque to the MEDICAL DEPARTMENT DETACHMENT, VETERINARY SERVICE, of Station Complement, 1775TH SERVICE COMMAND UNIT, Fort Snelling, Minnesota, for superior performance and outstanding devotion to duty in connection with food inspection activities for a period of over two years.

RECENT DIRECTIVES AND PUBLICATIONS

This list is intended as only a brief reference to the items mentioned. Before acting on any of them, the original communication should be read. Request for copies, when made, should be directed to the source of communication through proper channels.

WD Circular No. 19
15 Jan. 45
Sect. II
will be returned to point of entry into military service upon completion of maximum hospitalization.

ASF, Headquarters Circular No. 30
26 Jan. 45
Part III, Sect. II
Staff's office. Provides that reference memorandum is to be strictly adhered to, and that all action transpiring between W.D. and White House be cleared as required.

ASF, Headquarters Circular No. 33
29 Jan. 45
Part II, Sect. I
for his care. Other x-ray films to be salvaged.

WD Circular No. 32
27 Jan. 45
Sect. IV
for recording immunizations of personnel upon entry into service. Makes provisions re preparation and disposition of such form.

ASF, Headquarters Circular No. 44
7 Feb. 45
Part II, Sect. II
Nurses Aides. Amends sect. V, A.S.F. Cir. No. 226, 1944. Provides that no active recruitment of paid nurses' aides will be conducted by A.S.F. installations. However, appointments of such employees may be made in accordance with instructions set forth.

WD Memo 850-45
1 Feb. 45
on Department of Agriculture compilation. All W.D. agencies directed to cooperate in preventing introduction of plant and animal diseases into such territories to extent practicable consistent with adequate supply for armed forces.

AR 40-1010
C 3
1 Feb. 45
Importation. Sets forth summary of local regulations governing importation of plants, plant products, and animals into territories specified, based

WD Circular No. 43
5 Feb. 45
Sect. IV
Research. In order to facilitate research functions of Medical Department, permits have been granted to P.H.S. and Department of Agriculture with respect to importation into U. S. of living organisms, viruses, infected animals, serums, etc. Commanding officers are responsible for assuring that permits are used only for legitimate purposes and in accordance with Army, P.H.S., and Department of Agriculture directives. Sets forth text of permits and specifies certain exceptions thereto.

ASF, Headquarters
 Circular No. 45
 8 Feb. 45
 Part II, Sect. I

Discontinues penicillin therapy case report, effective immediately.

WD Circular No. 50
 15 Feb. 45
 Sect. VII

Vaccine. Refers to C 1, AR 40-2090, 30 Aug. 1944, which requires all Army horses and mules to be immunized against equine encephalomyelitis. Requisitions for vaccine to be forwarded to Army

Veterinary School, Army Medical Center, Washington D. C., in accordance with instructions set forth. Rescinds sect. III, W.D. Cir. No. 19, 1944.

ASF, Headquarters
 Circular No. 69
 26 Feb. 45
 Part III, Sect. IV

Discharge. States that many individuals have been transferred to personnel centers for separation who were in fact above minimum physical standards and should have been retained in service or separated under AR 615-368 or AR 615-369. Commanding officers considering personnel for separation are directed to review records with a view to their retention in service or application of appropriate regulations if they are to be discharged.

ASF, Headquarters
 B-43871
 Finance Bull. 16
 12 Feb. 45

Flight Surgeons. An aviation medical examiner who has been designated as a flight surgeon becomes entitled to the increased flying pay authorized on date he receives notice of the designation, and not on an earlier effective date stated therein, even though he has met the prescribed flight requirements for flying officers during the period between such effective date and the date he receives notice.

AR 615-361
 C 2
 1 Mar. 45

Discharge. No individual with a disability incurred in line of duty except those listed below will be discharged on certificate of disability until definitive treatment has been completed, or maximum

hospital benefit has been attained. Individuals having tuberculosis, chronic psychoses, or chronic degenerative neurological diseases will not be retained until maximum hospital benefit has been attained. Such cases will, however, receive appropriate treatment while awaiting disposition. Types of cases which should be retained for treatment include those requiring skin graft, bone graft, revision of amputation stumps, closure of colostomy, neurosurgical procedures, etc., and those with psychoneurosis severe enough to require hospital treatment. A diagnosis of psychoneurosis will not in itself constitute adequate cause for discharge under the provisions of these regulations. Each case so diagnosed will be evaluated from the following standpoints: (1) The type and severity of symptoms; (2) their external precipitating stress; (3) the premorbid personality and predisposition; and (4) the degree of incapacity. Only those individuals who are disabled for service and who give no promise of being able to render future service are eligible for discharge. Rescinds par. 9e(3)(f), AR 615-361, 4 Nov. 1944. An enlisted woman discharged under the provisions of this section will be furnished travel pay at the rate of 5 cents per mile for the distance from place of discharge to the place of acceptance for enlistment.

WD Circular No. 71
 6 Mar. 45
 Sect. II

Discharge. Combat-wounded enlisted men who have been returned from overseas may be discharged provided: (1) they are physically classified as permanently limited assignment under MR 1-9, 12 April 1944; (2) have been awarded the Purple Heart; (3) have been determined surplus to the needs of the Army as a whole.

WD Circular No. 71
 6 Mar. 45
 Sect. IV

Clinical Psychologists. Are available for assignment to neuropsychiatric sections of hospitals of 1,000 beds or more, including named and numbered station, regional, and convalescent hospitals and certain other installations. Requisitions to be forwarded to The Adjutant General through channels. Sets forth detailed list of duties of such personnel. Rescinds sect. V, W.D. Cir. 270, 1944.

Correspondence

THE WOUNDED MARINE

Condensation of an item by Technical Sergeant Keyes Beech, Marine Corps combat correspondent. Reprinted with permission from the Washington Daily News, 3 March 1945.

Iwo Jima—The first of the walking wounded came into the regimental aid station by himself. The flesh of his jaw was hanging by a piece. Lieut. Charles W. Hatch put the flesh into place and wrapped a bandage around the man's head. Above the bloody jaw clear blue eyes darted from face to face. Their expression was unreadable. He might have been trying to smile, or it might have been a snarl.

A hospital corpsman stood up to take the wounded marine down to the beach to be evacuated. He waved his hands and tried to talk, but only inarticulate sound came from his mouth. He shrugged and knelt down, a big, powerful man with blond hair cut so close that you could see his sunburned scalp. While the corpsman crouched beside him, the wounded man tried to write in the loose volcanic sand; but as fast as his finger wrote, the sand filled in what he had written, until finally in disgust he gave the sand an indignant brush with his hand and stood up. He was ready to go now.



THORACOABDOMINAL WOUNDS

Excerpt from letter from a member of a surgical auxiliary operating team, 22 January 1945, France.

We've had a run on thoracoabdominal wounds and have been unusually lucky with them recently. I think I've hit on a crude but often effective way of solving the dilemma-like problem these cases present. Almost always they come in with profound and prolonged shock. It takes enormous amounts of blood and plasma to haul them up out of shock. The necessary amount often exceeds the actual amount lost in hemorrhage. This constitutes a great hazard in the form of pulmonary edema after the first forty-eight to seventy-two hours. So one is between the devil and the deep blue sea. The question has been to choose between two main possibilities threatening life: immediate death from shock if insufficient intravenous therapy is employed, or death later from over-increasing the blood volume and throwing the patient into pulmonary edema.

Having no scientific or accurate means of controlling the physiological processes involved, I've crudely handled it by pulling the patient out of shock by giving the necessary amounts of blood and plasma (whatever they may be), operating, then watching closely postoperatively for the earliest possible signs of pulmonary edema and observing the hematocrit. If edema threatens, I immediately perform a venesection and draw off 500 cc., 1,000 cc., or more, if necessary, of blood. This has worked several times. Also, a waiting interval of an hour or two between chest operation (to stabilize respiratory apparatus) and exploratory laparotomy makes a tremendous difference in the stabilizing of the patient's condition for further work.



U. S. Marines carry wounded buddy to the beach at Tarawa. Marine Corps photograph.

Special Article

UNIT TRAINING OF EVACUATION HOSPITALS

This material, gained from experience overseas, is published to aid evacuation hospital commanders in training their units for overseas operation. This unit training of necessity must be preceded by thorough, continuous, and exacting individual disciplinary training to maintain constantly a high standard of proficiency. The preponderance of the training effort should be directed toward preparation of the unit for obtaining proficiency in its primary mission—third echelon medical service.

Simplicity, flexibility, and mobility are the prime essentials of this type of hospital, and all planning must be directed to this end. While the 750-bed evacuation hospital is not primarily mobile and the 400-bed is only semimobile, by training the various sections to have a simple functional setup, the hospital will be able to pack and move on short notice and to set up quickly on arrival at a new site. It must be able to expand rapidly and to give adequate care to large numbers of medical or surgical patients as the need arises. An evacuation hospital receives patients from clearing companies and a few by direct admission when casualties occur in nearby areas. Normally, the hospital is 10 miles or more behind the front, depending on the tactical situation and terrain. As the front pushes forward, the evacuation hospitals usually advance by "leapfrogging." Patients are normally held from ten to fourteen days, but the evacuation policy, as directed by the Army surgeon, may vary from two to thirty days, depending on the admission rate.

Movement

Selection of site. The area selected must be sufficiently large to allow the hospital to be set up at least 100 yards from any well-traveled routes of transportation. If the hospital is established immediately adjacent to a main road, there is annoyance from dust and noise and danger from strafing by enemy aircraft. Allowance must be made for expansion of the 750-bed hospital to 1,200 to 1,400 beds and for expansion of the 400-bed hospital to 500 to 600 beds. The site for the 750-bed and 400-bed hospital should be a minimum of 300 by 300 yards and 200 by 200 yards, respectively. Care must be exercised to avoid setting up in the vicinity of military installations, such as docks, dumps, railroad depots, or artillery positions. Drainage of area must be carefully considered.

Leading plan. After reconnaissance and selection of a suitable area by the commanding officer, release of the area is obtained from the Army. In the case of the 750-bed evacuation hospital, arrangements must be made with the Army for transportation. The 400-bed evacuation hospital has sufficient transportation to move by two echelons and can secure additional transportation from Army or neighboring medical units and move in one echelon. An advance party from the hospital should be sent to the site if possible. Tentage for a functional setup of a 200-bed unit and an adequate number of men for erection of tentage, preparation of site, and digging of latrines should be included. If buildings are to be used, cleaning and disinfecting materials must be sent. A detailed plan is necessary so that the exact number of men and the materials needed will be available. The main body of the hospital will then follow within two hours to several days, depending on the tactical situation. A section of the hospital should be

From the Medical Section, Headquarters, Army Ground Forces, Washington, D. C. Material was furnished by Lieut. Col. Philip W. Mallory, M. C., based on his experiences with the 56th Evacuation Hospital in the North African Theater of Operations.

left behind to care for remaining patients until evacuation has been completed. The functional packing list shown in current directives should be used as a guide, but it will be necessary to add or redistribute certain drugs and other equipment to ward, operating, laboratory and pharmacy, and receiving sections so that they will be completely functional immediately on establishment of the hospital.

Types of Hospital Setups

Diagrams should be prepared, illustrating the various types of setups. Their use will depend on terrain and tactical situation. All personnel should be familiar with these diagrams. Suggested types of setups are:

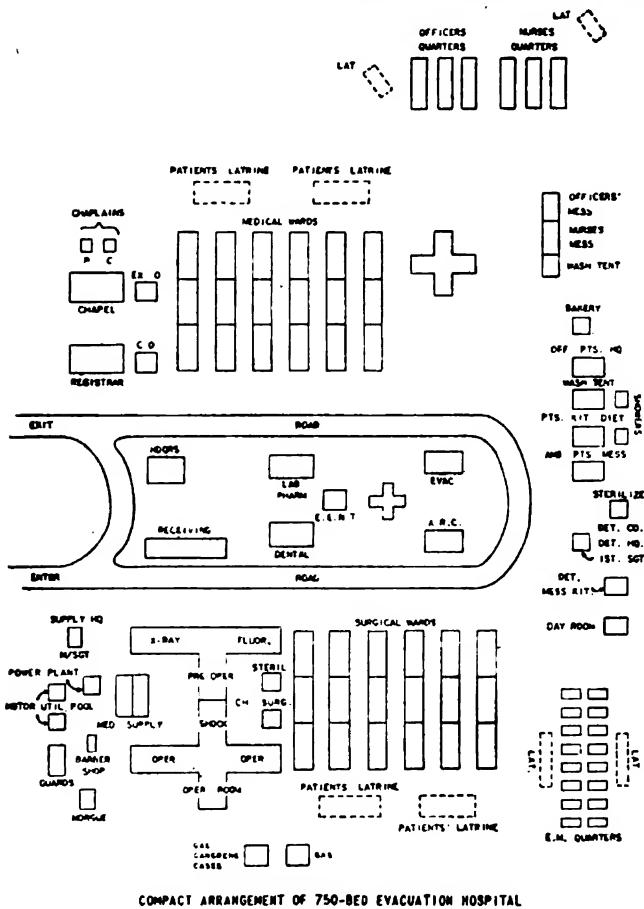


FIGURE 1

other important advantage of plan B is that it enables ambulances to drive to any ward without leaving the road and obviates the necessity of driving through the hospital area or of carrying patients by litter for long distances to ambulances. When use of buildings is indicated, consideration must be given to floor and window space, electrical fixtures, plumbing, heating, and to the presence of vermin. Buildings of one story are preferable.

Training Helps

1. Before the combined training period, all hospital equipment should be unpacked, set up, and used by all personnel. The hospital should be made functional during this time. This will give practical training to officers and enlisted men and familiarize them with the materials with which they will have to work later.

(1) PITCH PYRAMIDAL TENT (A) (MITTING USE OF SIDE ROPES AND STAKES 1,2,3,4). (2) ROLL SKIRT OF TENT A ON SIDE TO WHICH WARD TENT IS TO BE JOINED (C). (3) STRETCH OUT WARD TENT (B), USING A 20 INCH FOLD AT X, (GIVING SLACK FOR LACING TOGETHER OF TENTS AND SHRINKAGE). (4) DRIVE STAKES AND SECURE ROPES OF TENT (B) IN USUAL MANNER. (5) INSERT POLES OF TENT B. (6) HOOK CORNER ROPES (Z) OF TENT B TO CORNER POLES (Y) OF TENT A. (7) HOOK CORNER ROPES (E) OF TENT B TO SECOND STAKES (F) OF TENT A. (8) FROM THIS POINT PITCH TENT B AND ADJUST ROPES, TO COMPLETE THE UNION. - (1) TIE TENTS TOGETHER, USING END ROPES OF TENTS A AND B. (2) ROLL SKIRTS OF TENTS A AND B TOGETHER. (3) LACE SIDE SKIRT OF TENT A TO SIDE SKIRT OF TENT B AT (G).

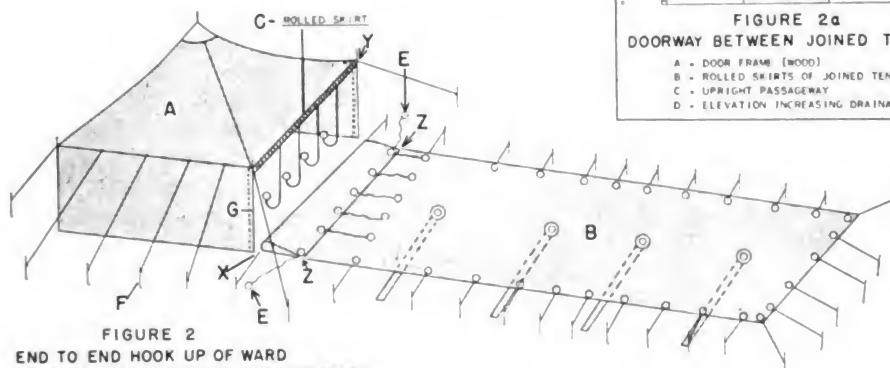


FIGURE 2
END TO END HOOK UP OF WARD
TO PYRAMIDAL TENT - OR WARD TO WARD

2. Tactical moves should be made as often as necessary to ensure proficiency in loading, unloading, and setting up of hospital.

3. All personnel should be trained in tent pitching of all types until proficiency is attained and then maintained by continuous training. Each section should have one or more tent pitching teams, depending on the strength of the section. All men must learn how to hook ward tents together, either side by side, end to end, or by joining pyramidal tents (figure 2). In this connection, improvised heavy wooden mauls (figure 3) will be very useful.

4. All personnel should learn to fabricate blackout entrances for ward tents, using ward tent covers and scrap lumber (figure 4).

5. If defense against air attack or artillery is necessary, training should be given in protection of patients and personnel on duty by "digging in" of tents. One satisfactory method used is

to excavate the interior of the ward tent to a depth of 30 inches, piling excavated material immediately outside the tent where it will form an embankment all around the tent about $2\frac{1}{2}$ feet high.

6. Medical and surgical technicians must be adequately trained. The better their training, the better the medical officers will be able to devote their energies to professional procedures. It is not enough that as many technicians as possible be sent to service training schools, but this should be supplemented at all times by as much practical work as possible within the hospital itself. These technicians should be trained in groups of three or four and checked by roster as proficiency is attained. The "county fair method," or practical demonstrations and personal application in booths of medical and surgical procedures, has been more successful with large groups than the lecture method. Practical training may be obtained by

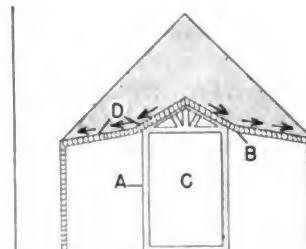


FIGURE 2a
DOORWAY BETWEEN JOINED TENTS
A = DOOR FRAME (WOOD)
B = ROLLED SKIRTS OF JOINED TENTS
C = UPRIGHT PASSAGEWAY
D = ELEVATION INCREASING DRAINAGE

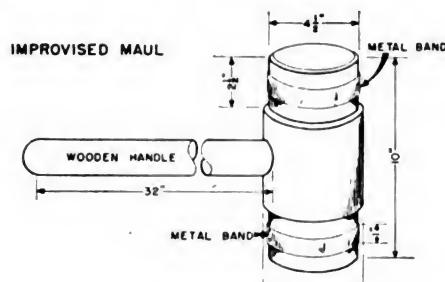


FIGURE 3

placing men for short periods in nearby fixed installations. Personal contacts should be made with officers under whom these men will work to ensure adequate and continuous supervised training. During the combined training period, actual operation of the hospital can be successfully undertaken, using actual cases from nearby fixed hospitals for patients. Minor operative procedures can be performed in such manner that the same

training will be received by technicians as if they were major surgical procedures.

7. Other specialists, such as mechanics, clerks, plumbers, electricians, and cooks, should be sent to post installations for short periods of training to make the entire hospital self-sufficient and independent.

8. Sick and wounded departments of fixed hospitals should be used for training of registrar personnel.

9. All Tables of Organization positions should be covered with trained personnel two to three deep for each position. Each

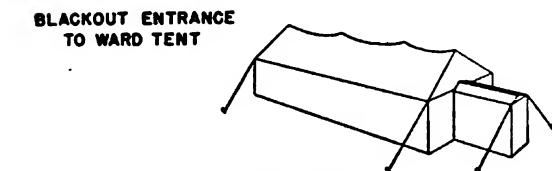


FIGURE 4

man should be trained to fill the duties of at least two positions. For example, headquarters clerks should know procedure of admitting patients to hospital so that they may assist in the receiving section when admissions are heavy.

10. Normally, the rules of land warfare prescribed for hospitals by the Geneva Convention will be followed. A suitable Red Cross marker should be placed on the ground as soon as the unit arrives in a new location. Every hospital tent or building must be plainly marked with a red cross on each side of the roof.

11. Road signs should be placed at all road junctions within a radius of five miles, so that ambulances may readily locate the hospital. In front of the hospital an illuminated sign, invisible from the air, should be erected. Each hospital section should be plainly marked with appropriate signs.

Section Breakdown

Receiving. The receiving office, one of the most important sections of the hospital, should have competent officer and enlisted personnel. The receiving officer must have mature professional ability in order to sort rapidly and classify casualties accurately. The chief of the surgical service cannot be there at all times to assist in sorting patients. All clerks in the hospital should be trained in the procedure of admitting patients. All enlisted personnel must be able to act as litter bearers. Casualties have been admitted in active theaters at the rate of 60 to 90 an hour. Some 750-bed evacuation hospitals at times have admitted more than 500 patients in twenty-four hours and 1,150 patients within thirty-six hours after the hospital opened.

Sick call for the unit and nearby units may be conducted in a part of one of the receiving tents and by the receiving officer, thus eliminating the need

for keeping another medical officer in a dispensary. At least four first-aid boxes should be constructed of a size that each may be carried by one or two enlisted men in addition to their packs. These boxes should contain enough drugs and dressings to enable a medical officer to hold sick call with them for short periods of time. When the hospital is split up in movement, a box should accompany each section.

Records. In addition to records required by current directives, it has been found important by some hospitals in active theaters to maintain records not specifically called for. It may be useful to initiate 52a cards (nominal index cards) in duplicate for each patient admitted, one copy being sent at the end of the day to the registrar for use in the patient-locator file, the other copy being placed in the field medical jacket. The same information that is placed on the field medical record should be written by the ward officer on the 52a card. This copy is retained by the registrar when the patient leaves the hospital and forms a permanent record. If the 52a card is not available, typewriter second sheets may be torn into three parts for this purpose.

Evacuation section. With the rapid turnover of patients it may not be practical to maintain evacuation wards since they would be used only part time and officers, nurses, and enlisted men would have to be assigned to them for only part-time duty. By leaving patients in the same ward until evacuation, they remain under care of the same personnel throughout their hospital stay, and moving the patients one more time is obviated; also, evacuation may not be a regular daily procedure, as the number that may be evacuated will vary as directed by the Army surgeon.

Patients ready for evacuation are reported daily by the ward section and the report shows whether they are litter or ambulatory patients. Personnel of this section should be trained to examine each patient as he is placed in an ambulance, to make sure that he has his valuables and records, is properly clothed, and that his physical condition is such that he can withstand being transported. All records must be critically examined for completeness and the 52a card, if maintained, withdrawn for use of the registrar. It may also be used for making a disposition sheet.

Registrar. In the theater of operations, many reports and records are required of the registrar's office. The admission sheet and disposition sheet must be very accurate. Personnel may receive valuable training for short periods by working in nearby fixed hospitals during the training period. They should learn how to make all charts and graphs showing the activities of the hospital.

Although not required by current directives, it will be found useful if personnel are trained in maintaining a diagnosis index. Personnel of the registrar section should become familiar with the reports required by fixed installations, as this will be beneficial in the preparation of anticipated reports overseas.

Medical and surgical service. While not specifically shown in current Tables of Organization, a definite medical service should be established under the supervision of a qualified medical officer. Experience of hospitals in active theaters has been that the percentage of medical patients may vary from 40 to 90 percent of the total admissions. In anticipating the need for this type of service, flexibility and simplicity of the ward sections must be observed. The personnel should be so trained that a ward may be used as either a medical or surgical ward if the occasion arises. The functional packing list of the ward section should be similar for both services and be so fixed that, by the addition of a few instruments or other items of equipment, a type ward could be used for the care of special types

of cases. All ward, pharmacy and laboratory, and surgical boxes should be so constructed that they can be used as desks, medicine cabinets, instrument cabinets, etc., when the hospital is operating. In the compact type of hospital setup (figure 1) recommended, it will be seen that when three ward tents are hooked together, end to end, they will form a single 60-bed ward. Fewer personnel are required for adequate care of the patients when they are all under one roof than when they are separated. An active ward of this type may be maintained under the supervision of one medical officer, one or two nurses, and three enlisted men during the day; and at night, one nurse and two enlisted men. The enlisted personnel should be given practical training in care of the patients. The functional packing list of a ward should contain all items necessary to make that ward complete and ready for care of patients. The wiring for each tent should be

placed in the ward boxes when they are packed so it will be immediately available when setting up the ward. Tent poles may be staggered (figure 5) in the ward tent to facilitate the movement of litter patients. Discarded x-ray film or other transparent material may be placed in the stove vents of the tent to admit additional light. The en-

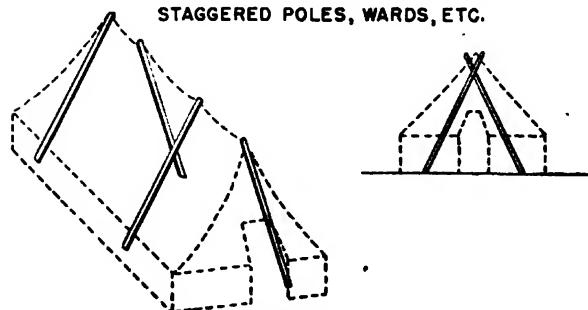
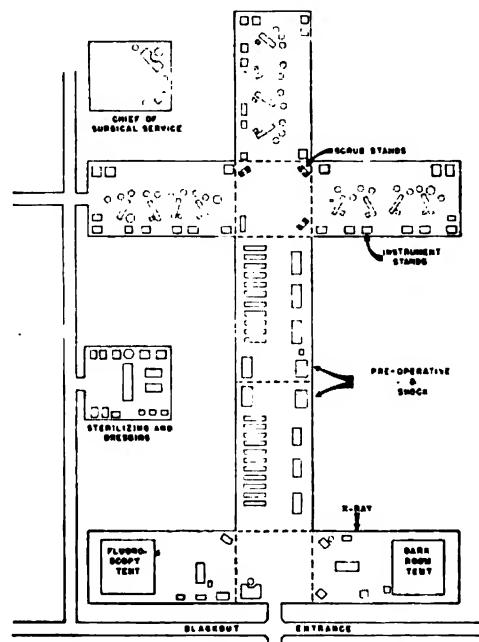


FIGURE 5

listed men should learn how to put up mosquito nets in the ward tents on wires suspended from tent poles, for mosquito-bar stretchers and frames may not be available. They should also know how to make cubicles in the wards by using sheets, blankets, or shelter-halves.

Training must be thorough in the care of bedpans and urinals. One method for disposal of human excreta from bed patients is to construct, near the ward sections, a pit built along the lines of an ordinary pit latrine. A hole 4 by 4 by 4 feet may be dug in the ground and covered by a box with a hinged lid. Nearby, there should be soap and water, cresol solution, and scrub brushes for cleaning and disinfecting the bedpans and urinals. Then they can be air-dried on racks outside the wards. A pit must be given the same daily care that is given latrines.

Operative section. Reports from hospitals overseas show they have done an average of 40 to 70 surgical procedures a day for many days at a time. Specialists are often called on to do operations such as débride-ments during periods of stress. It



INTERIOR ARRANGEMENT OF OPERATING SECTION

FIGURE 6

has been found expedient to divide the general surgical instruments into functional packs, each pack for a surgical team. Experience has shown that so many patients need general surgical care that the chief of service should form more general surgical teams than called for in the Tables of Organization. Specialists may be used when not busy with special types of cases. Many surgeons prefer that the chief of surgical service have under his control all wards which contain surgical patients and that the patients remain under the care of the medical officer who operated on them.

The compact type of hospital arrangement permits patients to be given complete surgical care under one roof (figure 6). All facilities are near the receiving tent to eliminate long litter carry. If sufficient darkroom space is not available in the x-ray department, an additional darkroom may be constructed from salvaged canvas, an old wall tent, or a pyramidal tent. In some hospitals no attempt is made to separate the shock and preoperative departments, since these procedures may usually be carried out in the same tent. When ward tents are used for operating rooms, it is not desirable to have the tent poles inside the tent. Their removal may be accomplished by using pipe or 4-by-4-inch lumber or wire between two tent poles placed on each side of the tent with the lumber or pipe passing under the steel plate between the chains at the top of the tent (figure 7).

Lighting facilities and prevention of contamination by dust, etc., inside the operating room may be improvised by lining the inside of the tents with sheets, muslin, target cloth, or other light-colored material which may be available. A floor in the operating tents is desirable and may be made from salvaged canvas or scrap lumber.

Insect-proofing may be done by placing screen wire or salvaged mosquito netting between the tent-skirt seam and the ground; then the sides of the tent may be rolled up during warm weather. This also permits the entrance of more light. These things should be practiced by the unit during its combined phase of training. It also has been found more practical to have a central sterilization room or tent near the operating room, which will serve all departments of the hospital. This eliminates the need for keeping many sterile supplies in wards where they are not used frequently.

Technicians assigned to the operating room must be able to assist surgeons, if necessary, in doing operative procedures, because nurse assistants may not be present when the hospital is first opened at a new site. This training will be greatly facilitated if patients are obtained from nearby hospital and actual operations performed. Minor procedures, such as the removal of cysts or the treatment of boils, may be conducted in such a way

EXTERIOR POLE SUPPORTS, SURGICAL TENTS

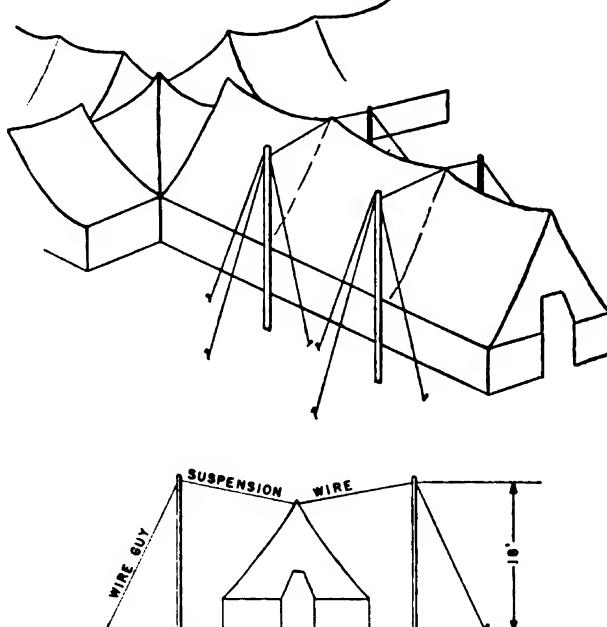


FIGURE 7

that enlisted men receive the same training as if they were major surgical procedures.

Laboratory and pharmacy. Technicians of these departments must be highly trained and the pharmacists should also be able to carry out simple laboratory procedures. Reports from active theaters show that as many as 3,000 laboratory procedures and 2,500 prescriptions may be necessary in a thirty-day period of operation. The equipment of the laboratory and pharmacy must be packed so it could be set up for the operation of two separate and independent units should the hospital be called on to give medical care in two different locations at the same time. Personnel must know how to prepare and maintain a blood bank. The mechanical refrigerator issued may be fixed so that it will maintain the necessary temperature for the storage of blood by placing cork or other suitable insulating material just below the freezing unit in the refrigerator.

Mess section. During the training period, the necessary personnel should avail themselves of the courses offered at the Army Service Forces schools and should learn how to prepare field rations in a palatable manner. The equipment should be divided so that at least three separate messes of varying size could be maintained at the same time. Normally, these would be used as follows:

<i>Evacuation hospital</i> (400-bed)	<i>Evacuation hospital</i> (750-bed)	
2-stove mess	3-stove mess	— for officers and nurses
3-stove mess	5-stove mess	— for detachment
6-stove mess	10-stove mess	— for patients

Any section of the mess could be sent forward with the advance party, depending on its size. Field sanitation and knowledge of simple practical measures cannot be overemphasized.

Supply and utilities. Supply procedure in overseas theaters is covered in current manuals. If personnel are trained in the normal supply procedures in the zones of interior, they will be readily able to adapt themselves to their duties in theaters of combat. It is very important to maintain an adequate supply of expendable reserves. A system should be developed during the training period so that personnel may have up-to-the-minute knowledge of these supplies as they are used, and requisition may be immediately submitted for their replacement. An adequate amount of blank forms should always be on hand. It may be necessary to maintain a supply of clothing to outfit patients properly as they return to duty or are evacuated.

The utilities section should be so trained that it can give proper maintenance to the equipment and be able to install any devices which are needed in the operation of the hospital.

The sanitary section is placed by the Tables of Organization in the supply and utilities section. These men should receive adequate personal training for their duties. Sanitation is of prime importance during combat. Much sickness is the result of improper sanitation. Standard procedure for the care of latrines and disposal of waste must be adopted and thoroughly impressed on all individuals during the training period.

Conclusions

The following points cannot be overstressed in preparing an evacuation hospital for service in combat areas: (1) Simplicity and flexibility are the cardinal virtues of an evacuation hospital. (2) Adequate and continuous training of all technicians in small groups and in practical work. (3) Covering of all Tables of Organization positions at least two to three deep with trained personnel. (4) Experimenting with various types of hos-

pital setups, by day and by night, until all personnel are thoroughly familiar with all material. (5) Planning the functional packing and training of the unit so that it may be readily divided into at least two separate institutions which may function independently in different locations. (6) The constant practice of packing, moving, and repacking all hospital equipment and supplies according to a definite loading plan will ensure the mobility so greatly desired.



American "medics" set up battalion aid station on Western Front. The enemy is beyond the hill. 21 December 1944.



A division moves up to Cisterna, Italy, to "mop up" and push on down route 6. "Medics" are at right. Signal Corps photographs.

Suggestions to Improve the Early Treatment of Hand Injuries

STERLING BUNNELL, *M. D.*

Civilian Consultant to the Secretary of War

From a survey of general hospitals in the zone of the interior most hands injured by gunshot wounds show considerable crippling which could have been prevented by early proper selection of treatment in the theater of operations and in the zone of communications. Commonest are stiffening of joints, faulty position of hand, excessive induration, and malunion of fractures. Most proximal finger joints are held straight and stiff and the wrist in the straight instead of dorsiflexed position. In some there is the position of flat palm with thumb at the side. Where possible a splinted hand should be in the "position of function." Brief directions for early treatment to guard against these prevalent conditions are offered.

Joints of the whole hand stiffen if all are included in the splint. Only the injured part should be splinted, the remaining digits being left free to move throughout their range. The thumb should be free distal to the thenar crease so it may come forward in opposition, and the fingers free distal to the distal flexion crease in the palm so their proximal joints can flex to a right angle. If proximal finger joints are held straight, they will stiffen so and then cannot flex, but if held flexed, they can extend and will remain flexible because in this position the collateral ligaments are taut and thus cannot shorten. Surgeons overseas and on hospital ships should see that uninjured digits are free to move and should compel patients to keep moving them to gain and maintain motion. A special detail to compel these ambulatory patients to keep their fingers moving is well worth while. The muscle and tendon action improves circulation, nutrition, and mobility of the hand and forearm. Stiffness in hand joints is readily prevented but is most difficult to cure.

Excessive induration, scar tissue formation, and flexion contracture result in a hand if wounds are allowed to remain open too long. As soon as granulations are clean, they should be closed over by a thin skin graft. Pedicle grafts are substituted later. Where flexion contractures are in evidence, corrective splinting will lessen the degree of contracture.

Much malunion is seen from the lack of traction in the first three or four weeks. The metacarpals and phalanges show overlapping and faulty rotation. The metacarpals buckle backward

toward the dorsum of the hand and the proximal phalanges buckle volarward, both upsetting muscle balance from the point of angulation distally. In treating either of these fractures the plaster cast on the hand and forearm furnishes a foundation for the metal extension for the use of traction. This extension may be by a padded duralumin strip or a long loop of soft wire drawn straight, incorporated in the plaster at palm and wrist, padded and extending beyond the flexed finger. It is curved so the proximal finger joints are in 45 degrees of flexion and the interphalangeal joints flexed still more. The finger, or fingers, lie along such a curved extension which in turn is held in place by a cord extending from it to the forearm to maintain this flexion. Traction on the finger is by adhesive on skin if there is no displacement. Otherwise, pulp or skeletal traction is used from finger to extension apparatus. For either, a stiff piece of stainless steel wire or a fine Kirschner wire is used, bending each end down the finger to end $\frac{1}{2}$ inch beyond the finger tip as a ring or hook to which is attached the traction cord. Special traction bows or steel safety pins may be used.

If pulp traction is used, the wire, pointed by clipping it obliquely, is thrust through the finger pulp from side to side. It should penetrate exactly at the spot marked in the diagram opposite the mid portion of the nail so as to avoid the sheath of the flexor tendon, the phalanx or the matrix of the nail. In skeletal traction a fine size of Kirschner wire is drilled laterally through the head of the proximal phalanx, avoiding the joint and lateral bands of the dorsal aponeurosis. This traction has the additional advantage of keeping the collateral ligaments of the proximal finger joint drawn out long. Unless they are of normal length, the joint will not be able to flex. The position of flexion of the joint also keeps these ligaments long for, if these joints should be allowed to remain in the position of extension, these ligaments would shorten in this position, thus making flexion impossible. The straight splint, flat splint, or a banjo splint should never be used. They throw the fractures out of

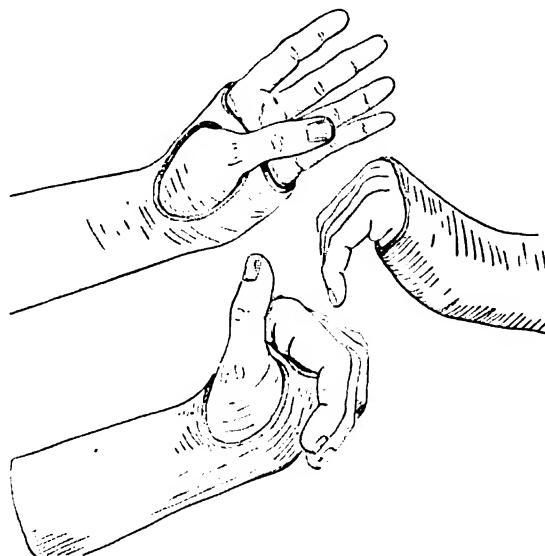


FIGURE 1. Correct way to apply a cast to hand and forearm. All fingers are free to move, because the cast does not extend farther than the distal flexion crease in the palm, and the thumb is free because the cast ends at the thenar crease. Wrist is in moderate dorsiflexion. Proximal finger joints can be flexed and the thumb opposed.

alignment and stiffen the whole hand in malposition. Only for rare special purpose should a plaster cast ever extend beyond the distal flexion crease in the palm or the thenar crease or include all of the fingers to their ends. The wrist should be in 20 degrees of dorsiflexion and the plaster curved in the palm to preserve the transverse metacarpal arch.

If the peripheral nerves are injured, the hand will be drawn into position of deformity because of muscle imbalance, thus necessitating splinting to protect the paralyzed muscles from being overstretched and to correct the deformity. For radial palsy the wrist is held in 20 degrees of dorsiflexion, the proximal finger joints straight, and the carpometacarpal joint of the thumb in extension, preferably all by spring action. For median and ulnar nerve palsy the clawing, flat-hand, and thumb at the side position are corrected by a small, light plaster of paris splint on the hand. The proximal finger joints are pushed into flexion, the metacarpal arch is curved by the palmar crossbar, and

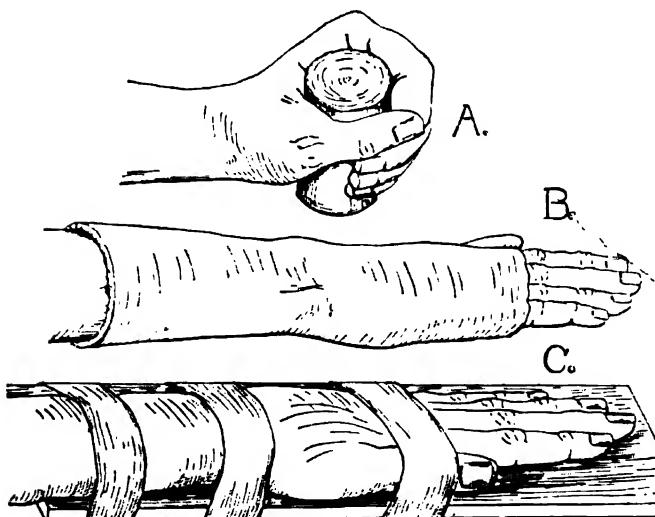


FIGURE 2. Three incorrect ways of splinting a hand, all of which contribute to crippling: A. Bandaging all fingers over a roller bandage stiffens the hand as a whole and the joints of all fingers. Only the injured digit should be splinted and the others free to move and should be kept moving. B. A plaster cast should not be applied with the wrist and fingers straight and should never include uninjured fingers beyond the distal crease in the palm. Result: Proximal finger joints will be stiff and straight, and the whole hand and forearm unexercised. Wrist, arches, thumb, and fingers should be in position of function. C. Strapping a hand to a board stiffens the whole member and in a position of nonfunction, namely with wrist straight instead of dorsiflexed, palm flat with loss of metacarpal arch, thumb at side of hand instead of in opposition, and finger joints straight.

by pressing on the head of the first metacarpal the thumb is kept in opposition. For palsy of ulnar nerve alone, only when the deformity is becoming marked should a light plaster cast be worn to hold the proximal joints of the last two fingers in flexion.

PLAN OF TREATMENT IN THEATER OF OPERATIONS

The wounded hand receives only a dressing and bandage in passing through the battalion collecting station and clearing station. At the evacuation hospital, the limb is cleansed with soap and water, and the wound is débrided. A thin layer of j-

damaged surface is excised and foreign bodies are removed under the ischemia of a blood pressure band so as to avoid cutting nerves, vessels, joint capsules, or tendons. The blood is first expressed from the limb by an elastic bandage, if available. The wound may be irrigated with saline solution. Severed nerve ends in forearm are joined by one stitch of stainless steel wire to prevent retraction, and to wall out infection joint cap-

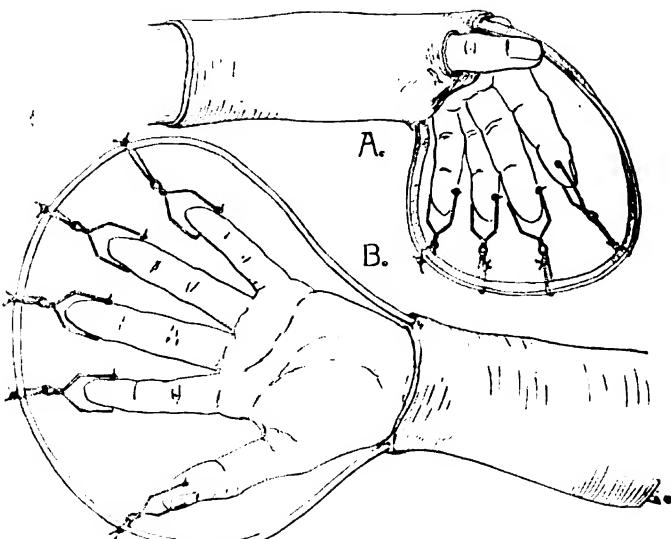


FIGURE 3. The banjo splint wrecks many hands. Pulls fingers in straight or wrong position which throws fractures out of line and stiffens all joints of digits. Fingers with traction should rest semiflexed on an extension support, as in figures 4 and 5.

A. Fingers in semiflexion should converge (see figure 5, D). Fingers are pulled straight and diverging. Thumb should not be inclosed in cast and wrist should be in dorsiflexion. B. Digits are pulled in wrong or straight position and are not really splinted as hand flaps back and forth. Will result in much stiffening and malunion.

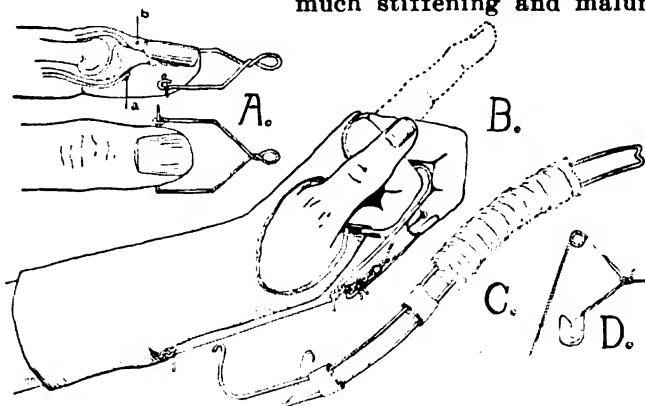


FIGURE 4. Correct method to apply pulp traction for fracture of phalanx or metacarpal: A. Pin transfixes at correct site, avoiding matrix (upper arrow), nail, phalanx, and tendon sheath (lower arrow). B. Plaster cast embraces hand and forearm, stops at distal crease in palm, leaving the uninjured fingers free to exercise throughout their range of motion and at thenar crease, giving thumb free motion of opposition. Finger whose phalanx or metacarpal is injured rests on padded wire extension (as in C) which is incorporated into plaster. A cord from wire to cast at forearm maintains the flexion. C. Extension made of soft iron wire with two strips of tin and padding. A strip of duralumin may be used instead. D. Method of using a steel safety pin for pulp traction. Point after transfixing is cut off.

sules are closed. The wounds are packed lightly with gauze. Never is a drain placed through and through. A pressure dressing with mechanic's waste is applied, placing the hand in the position of function and maintaining it so by a volar plaster splint applied outside the dressing—never by an uncut circular cast. Parenteral sulfonamide and penicillin are started.

Within four days to a week after injury, on ar-

riving at a general hospital, the first reparative treatment is started. Here a plaster splint with traction is applied. Also, the wound is closed by skin grafting. Traction has so often been incorrectly applied both in placing the wire and in pulling at a wrong angle, resulting in much damage, that directions for its accomplishment should be studied. If the positions of fractured metacarpals and phalanges be corrected at this stage, much crippling will be prevented. If the traction is applied with the proximal finger joint in flexion, the collateral ligaments will remain elongated and later the joint will be able to move. If

these ligaments are allowed to shorten, the proximal joints will become stiff and straight. Correct rotation of the bone may be ascertained by observing the plane of the finger nails and the plane of the motion of flexion of each of the fingers. The planes of motion should converge to the tubercle of the scaphoid. Attention to position of fractures saves the necessity in the reconstructive treatment of corrections by osteotomy. Early closure lessens induration and flexion contracture. All undamaged parts should move. Too

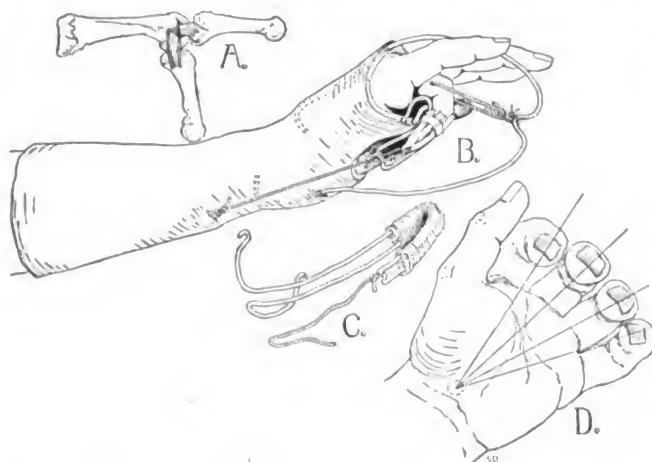


FIGURE 5. A. Shows collateral ligaments of proximal finger joint tight in flexion but relaxed in extension. If this joint is splinted in extension these ligaments so shorten that the joint cannot be flexed. If splinted in flexion and with skeletal traction the joint remains limber. B. Correct method of applying skeletal traction for fracture of metacarpal. Wrist in dorsiflexion 20 degrees and proximal finger joint flexed 45 degrees. Thin Kirschner wire transfixes neck of proximal phalanx and is bent, as shown for traction, to stiff wire extension loop from plaster cast. Finger is steadied by adhesive plaster on a wire extension (as in C) to maintain correct rotation. D. Showing guides to correct rotation in setting fractures. In partial flexion, planes of finger nails form an arch. Planes of motion of the fingers converge to the tubercle of the scaphoid.

long continued splinting stiffens hands. Most metacarpal fractures unite within a month. Maintaining the position of function—namely, wrist in dorsiflexion, proximal finger joints flexed and other finger joints slightly flexed, metacarpal arch curved, and thumb in opposition—together with persisting in active motion of all of the uninjured digits, will save months of disability. Special care should be used to keep the proximal finger joints in flexion and so to prevent stiffening.

Invasion Eye Injuries

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The eye patients admitted to this general hospital in four months following D-day presented a diversified picture, 53 having had injuries produced by enemy missiles while in action; 26 had intra-ocular foreign bodies and, of these, 17 were in sufficiently good condition that an attempt was made to remove the foreign body and save the eye. In making this decision the point of entrance with resultant damage to the ciliary body and uveal tissue was a prime consideration. When a large fragment had passed through the ciliary body with severe damage to the anterior portion of the eye and severe intra-ocular hemorrhage, enucleation or evisceration was done as soon as the patient's condition permitted. A large perforation in the posterior portion of the eye with marked loss of vitreous and obviously no hope of saving sight also was considered adequate grounds for prompt enucleation. The size and nature of the foreign body was also a factor, and the persistence of a low-grade iridocyclitis was considered an indication for enucleation. Of the patients on whom immediate enucleation was done, three had wounds in which the eyeball was penetrated anteriorly and posteriorly. Fourteen of the attempted removals of foreign bodies were successful. The failures, in the writer's opinion, were due to the absence or low degree of magnetism exerted by the foreign body. In two of the unsuccessful cases, the foreign body was copper and therefore showed no magnetic attraction. In these cases removal of the foreign body was attempted by forceps without success and the operation was followed by a chronic low-grade iridocyclitis so that an enucleation was done. These foreign bodies were less than a millimeter in diameter, and it was thought that when the eye showed no inflammatory signs, they might be left. However, as was to be expected with copper, the eye remained inflamed and an enucleation was done. In the other case the foreign body could not be grasped with forceps and apparently was insufficiently magnetic to be attracted to the magnet. In the unsuccessful cases, if the foreign body was small and the eye whitened within a few days it was left in. In the presence of prolonged iridocyclitis enucleation was done.

The average piece of metal from a high explosive shell 1 mm. in diameter was not attracted to the small magnet on a smooth surface until it was within $\frac{1}{2}$ -cm. distance. It was

found safe to insert the tip supplied with the small Lancaster magnet into the vitreous chamber as far as $\frac{1}{2}$ cm. Inserting it farther would require too large a scleral wound. The localization of the foreign body by the Sweet method was accurate to within a millimeter in cases where the exact location could be checked by direct vision. In six cases in which the foreign body was removed, it was necessary to use a forceps. This was done only where there was direct visualization of the foreign body and where the magnet failed to remove it. In only two cases were there any ill effects from this method. These cases showed vitreous hemorrhage and at the time of writing this paper every indication was that one would require enucleation. In the second case, a large foreign body was embedded in the optic nerve. The head of the optic nerve was completely obscured and the foreign body could be seen extending forward into the vitreous. As marked enlargement of the blind spot was observed and vision was steadily failing, the foreign body was removed. This was easily accomplished, but as was to be expected there was considerable vitreous hemorrhage from the site of the foreign body. At the time of writing, some absorption had occurred but not enough to give useful vision.

In preference to the small Lancaster magnet, a giant magnet was used in the later cases. This magnet, made by an ordnance company is equal in power and efficiency to the commercial magnet used in my private practice. The permanent magnet found in certain Signal Corps instruments is also more powerful than the small electromagnet and when it can be obtained is more useful. A posterior scleral incision was found to give better results than attempting removal anteriorly.

Three patients with intra-ocular foreign bodies developed traumatic cataracts. One of them developed a secondary glaucoma necessitating a linear extraction of the cataract. In the nine cases in which immediate removal of the eyeball was done, the eye was usually macerated or had large lacerations involving the sclera and cornea. In two cases there were large anterior and posterior perforations with the foreign body resting in the posterior portion of the orbit. In four cases the penetration occurred in the floor of the orbit involving the antrum also. The eye in these cases had apparently not been actually perforated by the missiles but was rather shattered and torn by the force of concussion of the impact. In these cases where there was involvement of the antrum, an antrotomy was done to give drainage from below. In two cases, the force of the impact had ruptured the eyeball posteriorly without fracturing the orbit or directly perforating the eyeball, the vitreous chamber was filled with blood, and there was marked limitation of motion of the eye. One required enucleation due to prolonged inflammation and atrophy bulbi; the other quieted down and caused no subjective symptoms other than defective

vision limited to light perception. In three cases of rupture of the choroid, none of them sustained a fracture or penetration of the orbit.

CHEMOTHERAPY

In all serious battle casualties penicillin and sulfadiazine were started on admission to the hospital. In most instances 200,000 units of penicillin were given in doses of 25,000 units every four hours and the drug then discontinued. In one case where anaerobic bacilli were recovered from the wound and gas bubbles were present in the flesh wound and in the eye, the drug was continued for five days and gas gangrene serum was also given. Recovery was uneventful. Sulfadiazine was given in doses of 6 grams daily for five to seven days and then reduced to 4 grams or stopped, depending on the severity of the case. The blood levels varied from 9 to as high as 16 on this dosage. Tetanus toxoid in 1-cc. doses was given in all cases where there was any question of previous administration. When there was maceration of the eyeball or a large laceration of the bulb, evisceration rather than enucleation was performed. The sclera was then cut off, leaving a frill around the optic nerve, or if the laceration extended quite far posteriorly the entire sclera was excised just as in an enucleation. Glass-ball implants were used except in cases which had marked damage to the posterior orbital tissue. After seeing the speedy healing, I believe they could have been used in practically all of the cases. A blank prosthesis was inserted within the first week and a matched prosthesis later. These were acrylic and were made in the dental department.

Two unusual cases of blast injury occurred in which no external nor internal damage was visible and no sign of brain injury. On admission, vision was limited to large objects and fields could not be determined. The first case on admission was thought to be malingering or suffering from hysterical amblyopia. Extensive examination and consultation revealed no other signs of either. After one week in the hospital and about ten days after the injury, thiamine chloride was started in doses of 50 mg. daily with prompt improvement. At the end of the first week on this treatment vision was 20/20 in each eye and the soldier was anxious to return to duty. A small central scotoma was found as vision improved to a degree where accurate fields could be taken.

Among the patients admitted for nonbattle injuries and diseases were several cases of iritis resulting from the usual type of focal infection. There was one retinal detachment in which no history of trauma could be elicited. Two holes were present in the retina and there was no sign of a tumor mass. This patient was operated on with good results and was discharged with vision of 20/40. There was one case of primary glaucoma in a soldier of 23 years. He did not respond to miotics and an iridencleisis was done with good results.

Two observations stand out: (1) the amount of damage which occurs as a result of battle injuries is usually much greater than anticipated by the external appearance of the wound; (2) the absence of purulent infection in even the more severe wounds, due undoubtedly to the early administration of penicillin and sulfa drugs.

Fractures of the Femur

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A major orthopedic problem in this general hospital in a theater of operations has been fractures of the femur. It is recognized that factors impossible to control may have contributed to the following observations. Thirty-five fractures of the femur, of which 16 were compound and 19 simple, have been received; 10 were admitted in satisfactory position and 1 with malunion, which consisted of anterolateral bowing with 1-inch shortening.

In this series of cases an average time of about twenty-five days had elapsed between injury and admission. In some cases this was due to the great distance these cases had to be moved, this hospital being about 1,500 miles from some of the battle areas. A number of these cases had been treated with some form of traction with satisfactory results until the traction was removed and a spica cast applied, resulting in redisplacement of the fragments. If the fracture had remained in traction for a period of six to eight weeks, this probably would not have occurred. However, in this theater it is the policy not to treat fractures in the forward areas by traction except in rare instances when extensive soft tissue damage makes it mandatory. It became obvious that the solution of this problem was to do a débridement on the compound cases, place the fragments in the best possible position, apply a plaster spica for transportation, and transport the patient to a general hospital as early as possible. The loss of several valuable weeks before definitive treatment of the fracture is started can thus be avoided. This is not only an initial loss of several weeks' time but may mean many months' delay in the subsequent healing of the fracture. Frequent change in the type of treatment interrupts continued immobilization of the fracture, which is so important in securing union.

The rate of repair of a fracture may be influenced by the age of the patient, impairment of blood supply, excessive trac-

tion resulting in separation of the fragments, infection, and many other factors; however, all these can be overcome by prolonged, continuous, adequate immobilization of the fracture.

While the majority of compound fractures admitted to the hospital were infected, in most cases the infection was localized, well controlled, and the patients were afebrile. Infection in itself, unless it causes massive loss of bone, almost never causes nonunion but is a cause of delayed union. An infected fracture is essentially the same as any other fracture, except that each stage of repair is longer and bone is destroyed at the fracture site by traumatic hyperemia and also by the hyperemia of the infection, which may last for months. Only when this infection has been controlled can healing and recalcification take place. It may be months before an infected fracture reaches the stage of repair that a simple fracture arrives at within a few weeks.

Another observation concerned primary débridement or subsequent excision. Some débridements were not extensive enough and petrolatum packs were, in a sense, truly packs acting as corks plugging the wound and preventing drainage. The term "packing" is a misnomer. Following a débridement or wound excision, the wound should be loosely filled with petrolatum gauze to keep it open for drainage and to allow it to heal from the bottom. If it is necessary to pack the wound to control hemorrhage, this should be done with dry gauze which should be removed within twenty-four hours and the wound loosely filled with petrolatum gauze.

In contrast to inadequate débridement we also observed too extensive and radical débridement or wound excision, with the loss of all continuity of the shaft because of the removal of large bone fragments. If these large fragments are removed at the time of the original wound excision or shortly after the injury, the surrounding periosteal tube collapses and there is complete obliteration of the subperiosteal hematoma. There is no longer a continuous hematoma between the fragments and the fracture cannot unite. In fracture of the femur, this presents a difficult problem. Bridging a gap of 2 or 3 inches by bone graft is extremely difficult, requiring many months of immobilization. If we choose to allow the fragments to remain in contact, there will be permanent disability due to the several inches of shortening. In many compound fractures the missile causes such extensive destruction of bone that a defect of several inches results. However, caution must be applied in the early removal of large bone fragments. A débridement must be thorough but conservative.

TRACTION PINS

In practically every case in which a Kirschner wire or Steinmann pin had been used for traction and later incorporated in a cast, it had been placed through the supracondylar region of the femur. Not only is it more difficult to place cor-

rectly a pin through this region than through the upper end of the tibia at the level of the tubercle, but this region has other disadvantages: chiefly, the possibility of a low-grade infection developing along the pin tract. If this should occur, the infection is so close to the quadriceps pouch that any degree of inflammatory reaction will produce strong, dense adhesions which may cause permanent stiffness of the knee joint. Tibial traction at the level of the tubercle is the safest and, if low-grade infection develops, it is far enough from the joint not to cause adhesions. The objection that this type of traction stretches the ligaments of the knee joint applies only when excessive traction is used for a long time. If traction is not excessive, the slight relaxation of the ligaments recovers when the tone of the quadriceps is recovered. Traction applied in this region has the mechanical advantage that the pull is applied below the insertion of the long muscles of the thigh and better relaxation can be obtained. Further, if open reduction becomes necessary, an infected pin hole is not in the immediate vicinity of the operative field. Most of the permanently relaxed knees caused by tibial traction, that we have seen, were due to faulty use of traction. Shortening which should have been corrected immediately or within forty-eight hours was incorrectly treated by the gradual addition of weight over a period of weeks. By this time there was already early healing of the fracture and loss of elasticity of the muscles. Traction was then exerted mainly on the ligamentous structures around the knee. In a few cases, Kirschner wires had been incorporated in the cast without the Kirschner bow, resulting in bending of the wire with complete loss of traction. The wire then acted merely as a foreign body.

Faulty position of the knee and ankle in plaster casts was also observed. Cases were admitted with the knee in a hyper-extended position and with the foot in marked equinus.

These positions allowed contractures of the quadriceps and the heel cord, contractures which are always difficult to overcome. This can easily be avoided by placing the knee in twenty-degree flexion and the foot in neutral position, that is, at a right angle with the leg.

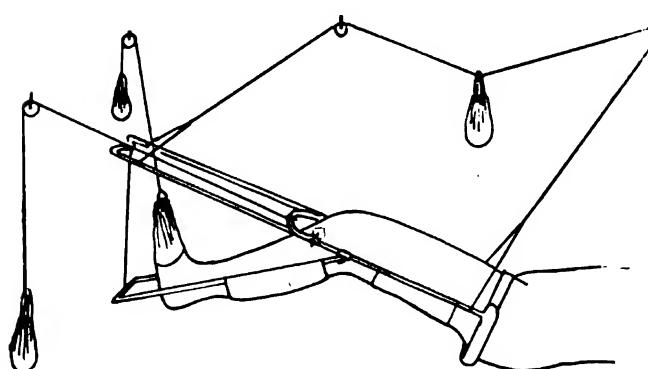


FIGURE 1. Suspended skeletal traction. The Kirschner wire inserted at the level of the tibial tubercle. A cuff of stockinet applied with Ace Adherent to keep the foot at a right angle with the leg. The knee flexed about 30 degrees.

The treatment instituted here can be divided into three types: (1) Cases admitted in satisfactory position and in an adequate spica cast were not disturbed except for a change of plaster of paris when necessary. There were 10 cases in this group. (2) Compound, infected fractures in poor position on admission were removed from plaster and treated in suspended skeletal traction with a Kirschner wire through the upper end of the tibia (figure 1). Of the 16 cases in this group, satisfactory position was obtained by this method in all. When healing was firm enough that displacement would not recur, the fracture was again immobilized in plaster. Penicillin was used in 6 cases of this type locally and intramuscularly: 25,000 units every three hours, or 200,000 units daily over a period of seven to ten days, intramuscularly, and a solution of 250 units per cubic centimeter, locally. It was difficult to judge the local response to penicillin in several of these cases because of the closed-plaster technique, but in cases in which the wounds could be inspected, a favorable response occurred; that is, drainage subsided and the wounds granulated well. Amputation was necessary in 1 case admitted with a severe compound fracture of the mid-shaft. There had been extensive damage to the soft tissues, a gas-bacillus infection, and complete paralysis of the extremity due to sciatic nerve involvement. (3) In 9 simple fractures of the femur in poor position, traction was first tried, but in 8 satisfactory positions could not be obtained. Six of them were treated by open reduction and plating, with a massive onlay bone graft from the tibia because the fracture was about two months old, and 1, a fracture of the base of the neck, was fixed with a Smith-Petersen nail following open reduction.

The question as to why open reduction was necessary in these cases may arise. These cases were admitted several weeks after injury and, since they were simple fractures, early healing had started; therefore, it was not possible to reduce them satisfactorily by closed methods. In the compound cases, healing was delayed by infection and traction could still secure satisfactory position of the fragments.

SUMMARY

1. Fractures of the femur are a major problem if we are to avoid permanent disability due to shortening, angulation, delayed union or nonunion, and permanent stiffness of the knee joint.

2. Angulation and shortening can best be avoided by properly applied suspended skeletal traction, which should be continuous until there is sufficient healing of the fracture to avoid redisplacement in the cast when it is applied. The time in traction is usually at least six weeks and may be much longer. It should not, therefore, be undertaken in forward areas.

3. In simple fractures, if traction fails to secure good position and we can rely on our aseptic technique, early open

reduction and internal fixation are satisfactory. If open reduction is done after six weeks, massive onlay bone graft is the most reliable method.

4. The entire fracture problem in a general hospital is usually a question of delayed reduction. It is much more difficult to secure reduction a month after injury than immediately, and this is especially true in fractures of the femur.

Clearing Company for Gastro-Intestinal Disease

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At the request of the surgeon, Fifth Army, a clearing company was organized as a center for gastro-intestinal disease, on 23 October 1944. The purposes were to determine whether patients with chronic gastro-intestinal disorders could be diagnosed with reasonable accuracy and discharged from medical channels within the Army area, without evacuation to the base for further study, and to study the factors involved in the diarrhea which was prevalent. There is considerable loss of effective manpower from overhospitalization, particularly among men with psychosomatic disorders. Evacuation hospitals have urgent needs for surgical beds during combat periods. Medical cases with obscure symptoms tend to be evacuated to the base at these periods because of insufficient time to evaluate, treat, and dispose of them on the spot. Gastro-intestinal cases make up the largest part of the psychosomatic group. Overhospitalization of this group always reduces morale and efficiency. The symptoms often grow worse as the gain from hospitalization increases. It is highly desirable that facilities be available for diagnosis and disposition within the Army area. Two hundred and twenty-seven patients were discharged during the four weeks ending 20 November 1944; 36 patients in whom the diagnosis and disposition have been established remain for completion of treatment. These 263 patients for whom adequate data are available are the basis of this report. The cases fell into two main groups: (1) epigastric distress, nausea, vomiting, or abdominal pain; (2) diarrhea. From the point of view of manpower conservation the first group is the more important, for it is these patients who make up the psychosomatic group and tend to be evacuated. Five medical officers were on duty at the station. A psychiatrist from another platoon spent part of each day seeing patients in whom an obvious N.P. factor existed, patients in whom the diagnosis was obscure, and patients in whom hospitalization was prolonged. Special forms were used to keep data and preserve a record.

X-ray and laboratory service. Arrangements were made with an evacuation hospital to do gastro-intestinal fluoroscopy. It was not considered advisable to x-ray every patient with epigastric distress. Peptic ulcer cases are relatively uncommon in this campaign and can be differentiated with reasonable accuracy on clinical grounds alone. Eighteen patients in whom the history was somewhat suggestive were x-rayed; one had a duodenal ulcer; two others had questionable lesions. These three were evacuated for further study. As a matter of policy, it is believed that x-ray should not be routinely employed. It is not the primary function of medical officers to make precise medical diagnosis in the Army area, but to evaluate the capabilities of the soldier for duty.

Every patient with diarrhea had one or more stool cultures at a medical laboratory where, in addition to the culture, a search for amebic cysts was made, using zinc sulfate flotation and staining technique. Two or more fresh stools were

TABLE I
Disposition of patients

	Hospital days— average	Total		Duty		Limited service		PBS	
		No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent
Upper abdominal syndromes	7.1	65	25	49	75.2	12	18.4	4	6.1
Diarrhea	9.3	167	63	152	91.2	8	4.7	7	3.5
Hepatitis	5.2	16	6	—	—	—	—	16	100.
Miscellaneous	12.4	15	6	10	66.7	—	—	5	33.3
Total	8.7	263	100	211	80.2	19	7.2	35	13.3

Limited service: Transfer to a convalescent hospital with recommendation for reclassification.

PBS: Transfer for either further study or treatment of an associated disease.

examined at our laboratory for amebic trophozoites and cysts in every case of persistent or unexplained diarrhea. All patients with persistent or unexplained diarrhea were proctoscoped. Sixty-six proctoscopies were performed.

Results. Sixty-five patients had upper abdominal syndromes, and 167 patients were admitted for diarrhea. The remainder were patients with hepatitis and with miscellaneous diagnoses, chiefly non-gastro-intestinal. Thus, of the 232 gastro-intestinal patients, about 30 percent had epigastric distress and 70 percent had diarrhea (table I).

UPPER ABDOMINAL SYNDROMES

On the basis of a careful history, physical examination, and a psychiatric interview in cases in which it is indicated,

reasonably accurate diagnosis can be made. It is less important from the Army's viewpoint to make an occasional mistake than to lose many men for effective duty by complete and thorough investigations which would necessitate evacuation. That most of this group of patients have no organic disease has been demonstrated at the base hospitals. The majority of chronic gastro-intestinal disorders are manifestations of psychoneurosis in soldiers.

The following types of patients with upper abdominal distress were treated:

1. *Psychoneurosis, anxiety state, manifested primarily by gastric symptoms.* This group, numbering 31, spent an average of 6.0 days in the hospital. They were interviewed by the psychiatrist who recommended reclassification on the basis of the severity of the neurosis in 36 percent. They had manifest anxiety but complained chiefly of abdominal pain or vomiting.

2. *Psychogenic dyspepsia.* This group represents basically the same disorder as found in group 1, but there is little or no manifest anxiety and the gastric symptoms are more "fixed." Only by careful evaluation of symptoms, x-ray of doubtful cases, and psychiatric study can the diagnosis be made. In this group of 19 patients, it was felt advisable to x-ray 8. These patients have little anxiety and do better than the first group in combat; 94 percent were returned to duty. They spent an average of 9.0 days in the hospital.

The two groups combined averaged 7.2 days in hospital; 76 percent were returned to duty. The remainder were discharged from medical channels within the Army area by recommendation for reclassification at a convalescent hospital.

3. *Miscellaneous abdominal pain.* This group consisted of 15 patients with acute gastritis, with ill-defined conditions not definitely due to neurosis, with patients thought clinically to have chronic gastritis, and with patients evacuated for further study on the basis of x-ray findings suggestive of peptic ulcer. Of the 15 patients, 73 percent returned to duty. Average duration of hospitalization was 7.0 days.

DIARRHEA

There were 32 patients with bacillary dysentery proved by culture; 3 patients had chronic dysentery, the remainder being acute cases who recovered promptly within a few days. The types of dysentery bacilli reported were as follows: Flexner 16, Newcastle 7, Schmitz 5, *ambigua* 1, Boyd 274, 3. The average number of hospital days was 9.0. Thirty percent had had attacks of diarrhea within a year; 6 percent had been hospitalized for it. Two patients were recommended for reclassification because of neurosis.

Infectious diarrhea with negative culture. This was the largest group (81 patients). They had acute or subacute

diarrhea dating back not longer than three weeks. Fever, nausea and vomiting, and bloody stools may or may not have been present. The stool cultures were all negative. Nearly all recovered within a few days of hospitalization, and nearly all received sulfadiazine therapy at this installation. The diagnosis was based on history and response to treatment. The average duration of hospitalization was 8.5 days. Twenty percent had had attacks of diarrhea within a year; 4 percent had been hospitalized for it. Three patients were recommended for reclassification because of an associated neurosis. It is more than likely that the majority of this group actually had bacillary dysentery.

Chronic diarrhea, cause not found. One-fourth of the diarrhea cases, 41 in number, had it longer than three weeks, often for several months, on and off. The dividing line between this and the second group was more or less arbitrary in many cases. These patients had no fever, the diarrhea being rather mild. They responded slowly to hospital treatment and did not seem to benefit from sulfonamide therapy. Often they were discharged still having two or three loose stools a day. The average hospitalization of this group was 12.4 days. Thirty percent had had attacks of diarrhea within a year; 15 percent had been hospitalized for it. All but two returned to duty, these being recommended for reclassification on the basis of severe neurosis. Among the factors considered in etiology, were: (1) Infection from the dysentery bacillus, with subsequent altered bowel physiology and heightened irritability; proctoscopic examination in this group revealed 12 cases with hyperemic or easily bleeding mucosa. None showed frank ulceration. (2) Amebiasis seems an unlikely cause. Although stools were examined in all patients in this study, cysts were found in only 3 cases and trophozoites in none. Two of these were carriers without diarrhea. (3) The consumption of coarse, cold field rations by a soldier who had infectious diarrhea could intensify and prolong it. (4) Ten patients were admitted with slight diarrhea and in all of them a marked anxiety neurosis existed. Most of them were returned to duty; some were recommended for reclassification on psychiatric grounds. The average duration of hospitalization was 8.2 days.

Hepatitis. Sixteen cases of hepatitis with jaundice occurred among the total group. All were evacuated to station or general hospitals according to directive. This disease always had to be considered in every case of diarrhea and epigastric distress.

Miscellaneous diagnosis. This group consisted of patients with various conditions, chiefly non-gastro-intestinal, who were admitted because of mild diarrhea but who had something else. It included two amebic carriers and one probable case of amebic dysentery, typhoid fever (one case), malaria, etc.

Hospitalization time. The average time of hospitalization for the entire group was 8.7 days from date of emergency medical tag to discharge. As time went on, this aspect improved. It is believed that an average of 7 days' hospitalization would be a reasonable estimate in a well-functioning gastro-intestinal center.

It should be possible to form an opinion and effect disposition, within two or three days, of the group in whom psychoneurosis is the cause of symptoms. Medical treatment and rest are rarely effectual in relieving symptoms in this group. If they are considered capable of performing further duty, it is best to discharge them as soon as possible, giving them a clear explanation of the etiology. Patients in whom there is good reason to suspect organic disease, such as peptic ulcer or hepatitis, must be observed carefully as long as is necessary to establish a diagnosis.

SUMMARY

1. Of 263 patients with gastro-intestinal complaints treated at a clearing company during a four-weeks period, 87 percent were discharged from medical channels (80 percent to duty and 7 percent to a convalescent hospital for reclassification); 6 percent were patients with hepatitis who were evacuated for further study or treatment. The average number of days of hospitalization was 8.7. Of 65 patients with upper abdominal syndromes, 6 percent needed further study and were evacuated to the base; 94 percent were discharged from medical channels (75 percent to duty). The average of hospital days in this group was 7.1. Of 167 patients with diarrhea, 4 percent needed further treatment at the base for associated but unrelated diseases. The remainder were discharged from medical channels, 154 (91 percent) to duty, and (5 percent) to a convalescent hospital for reclassification, on the basis of neurosis. The average period of hospitalization was 9.3 days.

2. Reasonably accurate diagnosis and disposition within the Army area can be made in about 95 percent of the cases, excluding cases of hepatitis which are automatically evacuated.

3. In patients with upper abdominal syndromes, significant saving in hospitalization has been effected and a considerably higher percentage of patients returned to duty than was possible with the same type of case at a general hospital.

4. In the majority of diarrhea cases, the cause was not definitely established. It is believed that bacillary dysentery is the primary cause of most of the cases. Anxiety with nervous tension, lack of desire to return to duty, and dietary irregularity probably contribute to the prolongation and intensification of the symptoms. Amebiasis was infrequently discovered.

CONCLUSIONS

Concentrating patients with gastro-intestinal disorders in one installation in the Army area is desirable, particularly in

periods of combat when facilities at evacuation hospitals for medical patients are strained. Excluding diarrhea, the majority of cases are psychogenic. Prompt diagnosis and disposition result in important saving in manpower in psychosomatic cases. These cases can be handled with economy and dispatch at an Army clearing station. By using standardized techniques of management, more cases can be handled in a shorter period of time.

Scrub Typhus from an Epidemiological Viewpoint

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At the beginning of the rainy season one of our hospital corpsmen came down with the first case of scrub typhus recorded on this South Pacific island. The first signs of the disease appeared about two weeks after leaving a large base on the New Guinea mainland. Although this first case ran a very mild course, soon virulent cases developed in our immediate camp area, which was roughly one-half mile square on a sloping, grassy plain between the mountains and the sea and surrounded by jungle growth. Kunai grass stood six feet high throughout the area.

In our epidemic of seventy-one cases the following facts are outstanding from an epidemiological viewpoint: the close association of disease incidence with kunai grass and rats; the well demarcated and limited areas of infestation; the coincidence of the epidemic with the rainy season; the high incidence of the disease among mess personnel; and the dramatic decrease in new cases when preventive measures were instituted.

The New Guinea rat is almost identical in appearance with the common rat of North America but it is bolder and less intelligent. A few rats are found each morning in the slit trenches which enlisted men dig outside their tents for protection against bombing. They come to the quarters at night in search of food or to nibble on a piece of white coral to satisfy their craving for salt. Their only natural enemy seems to be the hawk, of which I have seen a dozen circling over a mowing machine searching for rats as the mower cleared the kunai grass.

With one hundred rat traps we blanketed the hospital area according to a definite pattern. From the distribution of each morning's catch it appears that the New Guinea rat is a nomad, traveling in groups a short distance each night. Our nightly yield varied from ten to forty, and except for the kitchen where traps were always loaded, the catch distribution varied. Traps in one spot would be loaded one night; traps on the

other side of the hospital would be full the following night. Cured bacon was the best bait. Traps were washed and aired after the catch and the operators wore gloves to avoid the human scent.

The areas of infestation were sharply demarcated. The greatest number of cases came from tracts, one-half mile square, of kunai grass surrounded by jungle growth. One area was an exception to the rule, in that no grass was present. It was low, marshy ground traversed by many small streams. Huge trees provided dense shade. The scrub and vine undergrowth had been cleared away by the men of the infantry division encamped there. Only two of our seventy-one cases were charged against this area, and they developed the disease within four weeks after the division arrived on the island. It is not known whether these two men had visited other known areas of infestation.

Several cases could be traced to an area less than 100 yards in diameter where a unit was encamped. One pyramidal tent used for sleeping quarters produced three cases, all coming down within three weeks.

The rainy season commences in early November and ends in late February. The incidence of the disease increased with the onset of the rainy season, but the epidemic subsided dramatically about one month before the heavy rains stopped. Captain Charles Lose, Sn. C., A.U.S., was designated typhus control officer. The effect which all measures had on control of the epidemic was gratifying, but we were unable to evaluate independently any one of them. For his work Captain Lose was awarded the Bronze Star Medal.

The mess personnel of our station hospital represented about 10 percent of total assigned strength. Of the cases contracted in our immediate camp area, 20 percent were men on duty in the hospital kitchen. The trapping results in the kitchen showed a high prevalence of rats. No other rodents were in evidence. Even the small lizards so common around the quarters were seldom seen around the mess. The entire enlisted detachment and especially the mess personnel developed the jitters to the extent that several were admitted to hospital with psychoneurosis, anxiety type.

The incidence dropped sharply after control measures were adopted. These measures consisted of trapping rats, cutting and burning of kunai grass, spreading sand in the hospital area and around quarters, wearing of leggings, and the liberal use of insect repellents, dimethyl phthalate, and 612. All pets were destroyed.

At first insect repellent was available in only limited quantity and men could not be spared from hospital duties to cut grass or haul sand, as we were operating with patients 50 percent over normal capacity and without our assigned nurse personnel. In addition we were doing our own hospital laundry.

Early in December, the epidemic reached such proportions that the island commander dispatched one hundred native grass cutters to the hospital area and twenty large trucks for hauling sand. Up to that time (first week in December) more cases had been developing in area 1 (general hospital) than in area 2 (station hospital). The work was started first in the general hospital area. Immediately the incidence in the station hospital area increased. We feel that the rodents migrated from area 1 over to area 2, seeking cover in grass still standing in area 2. During the period when area 1 was cleared and area 2 was untouched, the rate of incidence in the two areas switched. Area 2 cases increased, while area 1 decreased. Then, when work began on area 2, the incidence again declined. This was all in conjunction with a vigorous rat-trapping campaign.

SUMMARY

The disease on this island reached epidemic proportions and showed a virulence out of comparison with that found on nearby islands. Evidence pointed to the rat as the important animal host; in addition, the lizard was strongly suspected. Infested areas were sharply demarcated. There appeared to be some seasonal connection. Incidence among personnel working in the hospital mess was abnormally high. The epidemic subsided abruptly after control measures were initiated.

Control of Sandflies with DDT

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The control of sandflies of the genus *Phlebotomus* has been notoriously unsatisfactory. Experiments during the past summer, however, have shown that DDT is an effective weapon against this group of troublesome and disease-carrying insects. That this method of control may be better understood, pertinent phases of the life-cycle and behavior of sandflies are outlined.

Sandflies of the genus *Phlebotomus* should not be confused with those of the genus *Culicoides*, which are also abundant and troublesome in certain regions but belong to another family and differ widely from *Phlebotomus* in many respects. The control methods described are not applicable to *Culicoides* so far as is known. It is important to be able to recognize *Phlebotomus* as such, and to discover the principal daytime hiding places. Sandflies of the genus *Phlebotomus* are small, hairy midges, 2 to 3 mm. long, easily recognized by the position of the wings,

which are elevated and spread to form a "V." They readily penetrate ordinary screens or nets and are almost entirely nocturnal. Only the females suck blood. At night sandflies may be found both indoors and out, feeding on man or animals or resting on walls nearby. During the day they seek a variety of shelters. They may be found in the darker corners and near the ceiling of sleeping quarters. The commonest outdoor shelters are masonry cracks, stone walls, excavations, animal burrows, hollow trees, and deep cracks in soil. Sandflies are easily seen on light-colored walls; however, in searching for them on rough, dark surfaces or in recesses, tobacco smoke is helpful since it causes them to move and thus reveal themselves.

The breeding places are difficult to demonstrate but typically are in loose soil or organic debris beneath stones, in masonry cracks, etc., in much the same kinds of places as the outdoor shelters. In open country free of stones they may breed in animal burrows or in open soil. The flight range is believed not to exceed 100 to 200 meters where breeding places are near human habitations. However, in open country with breeding places associated with widely scattered rodent burrows, flight ranges of 1,500 meters have been measured.

Those species whose habits have been studied tend to progress by means of short flights, alighting on stones, plants, and other obstacles as they approach a house. Instead of entering at once, sandflies tend to alight on the outer walls and then in a series of short, hopping flights with relatively long pauses make their way into the building. Once inside they may rest on the walls some time before attempting to feed. A similar lack of haste has been observed as sandflies emerge from stone walls during the first hours of darkness. They may rest at the entrances to such shelters as much as half an hour before taking flight. These flight habits render sandflies vulnerable to the residual action of DDT. The surfaces on which sandflies must alight and on which they spend considerable time are easily accessible and can be transformed into lethal traps or barriers.

EXPERIMENTAL WORK

In laboratory tests carried out in Italy it was found that contact with DDT gave knockdown without recovery in from six to fifteen minutes in the case of *Phlebotomus perniciosus* and *P. parroti* var. *italicus*, while *P. papatasii* required fifteen to forty minutes. In all cases agitation was noted within a few minutes, while fluttering of the wings and lack of coordination were frequent after about six minutes. The effect on feeding habits of those affected but not killed has not been determined.

Following preliminary control studies in Italy, more extensive experiments were carried out in Palestine near the Dead Sea. Professor S. Adler, of Hadassah University, Jerusalem, suggested the selection of this area where he had carried on sandfly work for many years and which offered peculiar advantages for

control studies. The British Medical Service furnished personnel, transportation, equipment, and much of the material. Field headquarters were established at the plant of Palestine Potash, Limited, at the north end of the Dead Sea.*

Phlebotomus in the Dead Sea area. The floor of the Jordan Valley near the Dead Sea (1,300 feet below sea level) is a flat expanse of salt desert, uninhabited except in small irrigated areas and at various installations, such as the Potash Works, along the shore of the Dead Sea. Sandflies, consisting almost entirely of *P. papatasii*, are abundant. They have been found in great numbers in places a mile from any human habitation. Cutaneous leishmaniasis is endemic in the area and is transmitted by *P. papatasii*. The desert is dotted with shrubs beneath which are found many rodent burrows. The breeding places of *Phlebotomus* in this region have not been studied, but the situation may prove to be similar to that in Transcaucasia where *P. papatasii* has been found breeding in rodent burrows, with the rodents apparently serving as their principal hosts and as reservoirs of cutaneous leishmaniasis.

Our principal experimental work was done at the Jewish Agricultural Settlement a mile north of the Potash Works. The living quarters consisted of about a dozen small four-room bungalows of uniform size and construction (smoothly finished cement), and with a uniform, abundant sandfly population. The houses were surrounded for the most part by bare, uncultivated soil. Houses were sprayed with DDT in the following ways: (1) inner walls and edge of ceiling, the window screens being protected from spray; (2) outer walls from ground to eaves, including doors, windows, and screens; (3) outside of openings only, i.e., doors, windows, screens, and a foot or two of the surrounding wall. The results were judged by comparing sandfly counts of sprayed and control houses, and by the bites reported by the occupants. In all cases the DDT



Living quarters, Jewish Agricultural Settlement, Dead Sea, Palestine, where sandfly-control experiments with DDT were carried out.

*Generous material aid was given by these organizations and many kindnesses were extended by Professor Adler, the officers of the British Medical Service and of the Potash Company, and others who followed the work closely and aided in many ways.

was applied as a 5 percent solution (by weight) in kerosene, at the rate of 1 to 1.5 gallons per thousand square feet.

Inside spraying gave perfect or near-perfect control with no bites reported. Spraying the outside of the openings only and spraying the entire outside both reduced the sandflies to about one-quarter the control counts, with very few bites reported. Comparable results were secured in experiments on a smaller scale at several other places in the region. The duration of the effectiveness of the treatment, which was undiminished during the twenty-four days of observation, is still to be determined.

A tent-spraying experiment at the Settlement, in which about one-half of twenty conical, double-walled tents were treated either inside or both inside and out, was interrupted by the onset of winter rains and high winds. Those observations which it was possible to make gave promising indications that tent-spraying may be as effective as house-spraying.

RECOMMENDATIONS

On the basis of the Dead Sea experiments with *P. papatasii* and the previous work in Italy with several species, we make the following tentative recommendations for the protection of occupants of buildings (sleeping quarters and rooms occupied after dusk, such as offices, control rooms, day rooms, mess halls, and clubs): *Spray the inner walls from floor to ceiling and as much of the ceiling as possible. Spray especially well the corners and upper part of the walls, the doors, windows, and screens. For greater margin of protection, spray also the outside of the openings (doors, windows, screens, ventilators, etc.) together with a foot or two of the surrounding wall.*

In the case of tentage it is suggested that, on an experimental basis, tents be sprayed inside, together with the outside of openings, i.e., door or flap, bottom edge, and ventilating holes.

The above measures depend entirely on killing sandflies or diverting them from a blood meal at the time they enter a building. The walls treated with DDT thus constitute a protective barrier and the method does not involve the destruction of sandflies either at their breeding places or outdoor shelters. With the limited objective of protecting persons indoors, the spraying of buildings has proved remarkably effective not only in our experimental work but in a number of instances where we have had the opportunity to observe the effect on sandflies of DDT applied for other purposes.

Persons out-of-doors should protect themselves by means of repellents and proper clothing. The repellent issued by the Army has been shown to be effective against *Phlebotomus*. Sandflies do not readily bite through ordinary clothing, although they may crawl beneath the trousers and bite through or above the socks.

In experiments in Italy and Palestine, spraying houses only on the outside was designed to test the possibility of reaching the

sandflies before they could enter and in addition, by treating also nearby resting places and potential breeding places, to destroy them at their source. Preliminary results indicate that where buildings are of masonry with many cracks, with nearby stone walls and rubble heaps, i.e., where shelters and breeding places are closely associated with human habitations, outside spraying alone gives a high degree of control. Under such circumstances it is quite possible that the proper selection of outdoor surfaces to be treated may give localized area control, with protection for persons both indoors and out. In one experiment carried out by Professor Adler at a village in northern Palestine, sandflies could be collected in great numbers on the stone walls of a courtyard during the early hours of darkness. A portion of the wall was sprayed with DDT, after which no sandflies at all were seen on the sprayed portion, while normal numbers continued to appear on the unsprayed part. This and other experiments indicate the possibility of completely denying to sandflies their principal outdoor shelters and breeding places. The larvae, protected by soil and debris at some distance from the entrance to the breeding places, would not be affected, but the adults would be destroyed on entering or leaving. The long life cycle of *Phlebotomus*, usually two or three months or more, and the consequently low replacement rate, combined with the constant destruction of sandflies at the DDT-treated surfaces of shelters, breeding places, and barriers between them and their hosts, would all favor the achievement of area control.

Obviously, the limits of effectiveness of the various methods of applying DDT are still to be worked out, as well as the adaptation of methods to local situations. In certain areas, such as at the Dead Sea, breeding places are apparently in open soil and possibly at considerable distances from houses. No method of attacking such breeding places has been worked out. In these cases control methods would necessarily be limited to house-spraying, of which the most effective single method has proved to be inside spraying. On the other hand, in the more common or even "classical" type of sandfly situation, with breeding places in masonry, under stones, in stone walls, and in any case closely associated with human habitations, outside spraying may serve not only for the protection of houses but in addition be extended to area control. Where malaria is also a problem, as it often is in sandfly regions, the joint objective of controlling both would dictate inside spraying in any case.

Further investigation on at least a village scale is desirable at this time to work out the practical applications of "house control" and to explore the possibilities of area control. It would also be desirable, wherever house-spraying with DDT is being carried on as an antimalaria measure, to evaluate its effect on any sandflies that may be present as well.

Dentistry in the Japanese Armed Forces

LIEUT. COLONEL CHARLIE H. HARRILL
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A dental survey has been made of a group of Japanese prisoners of war. All of those examined were enlisted men, with the exception of one officer. About half were from the Japanese Army and half from the Japanese Navy. These men came from different walks of life; 49 percent were from cities or towns, and 51 percent were from rural districts. Of this group only 7 percent had received any treatment after entering the service; 68 percent needed treatment at the time the survey was made. Obviously they were in good dental health when they entered the service on the average of three and one-half years before. The majority of them had been in the Solomon Islands and New Guinea Campaigns from the beginning.

This survey showed the majority of the men to be in good dental health. The soft tissues of the mouth, with a few exceptions, were in a normal condition; only one or two showed signs of periodontoclasia in its early stages. Calculus, slight, was present in about 20 percent of the cases. Caries was present in 63 percent of the men. The majority were occlusal cavities and in the posterior teeth; only a very small percentage needed emergency fillings. Eighteen percent of the group needed one or more extractions, five being the most that any one man needed. Every prisoner examined had a sufficient number of masticating teeth to meet the standard requirement set up by our Army. Sixty-six percent of the men examined had from one to eight teeth missing; in many cases these were third molars.

Not one denture nor partial denture was seen during the survey. All of the missing anterior teeth had been replaced by fixed bridgework. Not one man examined had any missing anterior teeth that had not been replaced. Most of the missing posterior teeth had been replaced with fixed bridges.

Only two types of fillings were found, amalgam and cement, an equal number of each. The cement was very hard and seemed to hold up under the stress of mastication. The amalgam seemed to be of a very cheap grade. Practically all of the work had been done in civilian life prior to entry into the service; only 7 percent of the group had received any treatment after entering the service; only 2 percent had fillings of any type. Since about one-half of the fillings were of

cement, it is believed that these restorations were made after the men entered the service, and possibly after they were sent overseas.

Since we did not see any fillings in anterior teeth, it is believed that crowns are used exclusively for restorations in the anterior portion of the mouth.

Stainless steel is used in the fabrication of about one-half of the crown and bridgework and gold is used in the other half. The stainless steel apparently is of poor quality for, while resistant to corrosion, it does not retain a high luster. Cast steel crowns and soldered gold crowns are used rather freely for restoring individual teeth; 45 percent of the men had one or more crowns. The majority of the anterior crowns that are made of gold are open face, a large percentage of them are of a suspended pontic type, the suspensions varying in width from one millimeter to the width of a single tooth. All narrow spaces between the anterior teeth are filled by this method. The crowns and bridges are well constructed. Full crowns or open-face crowns are used exclusively for abutment pieces. Practically all of the bridges are of the single-tooth variety. One bridge was seen that had as many as four teeth on it.

One bridge replacing the upper centrals and laterals was an acrylic (pink) bridge extending from cuspid to cuspid with open-face stainless steel crowns for abutment pieces and vulcanite teeth for facings. It was artistically designed, very serviceable, and very attractive.

The survey revealed that only 15 percent of the group had malocclusion. Only one class III, angle classification, was seen, and one class II; the others were class I. Calculus, consisting of slight and medium deposits, was found in about 30 percent of the group.

Considering that these men had been in service on an average of three and one-half years and that their average age was 24½ years, the mouth hygiene of the prisoners was good. However, the dental work found is not up to the standard set for our Army, either in material or workmanship.

Dental treatment in the Japanese Army is compulsory. The men are given two examinations, one at the time of induction and another at the port of embarkation. No other examination is given while overseas. Any metals used, such as gold and alloy, in making restorations are paid for by the person receiving the treatment. Any treatments that do not require the use of these metals are free.

Dental officers in the Japanese Army are well trained and are on the same status as other officers. Before being given a commission, the initial one being that of second lieutenant, the dentist must undergo an intensive training period of from three to six months, after which he appears before a board and if he passes the examination he is commissioned. There is one dental officer assigned to each one thousand men.

Roentgenographic Method for Localization of Foreign Bodies

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and
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Medical Corps, Army of the United States

The numerous methods published since 1896 when Buguet and Gascard¹ set forth the principles at the foundation of most of the present-day localizing methods are all technical variations of the two basic principles which must apply—parallax and similar triangles. Many years ago Shenton^{2,3} suggested a satisfactory, simple, and accurate method. Our object is to bring this method to the attention of medical officers whose work may require foreign body depth determinations and to present observations and experiments in support of it.

In teaching the subject of foreign body localization to the student technicians at the x-ray section of the Medical Department Enlisted Technicians' School, Billings General Hospital, a thorough search of the literature was made to find a film method which could be taught in conjunction with the U. S. Army Field Unit fluoroscopic method with the prime consideration being simplicity. It is of first importance that the enlisted technician have a satisfactory roentgenographic method at his command, first as an alternative to the U. S. Army field unit fluoroscopic method should any circumstances prevent the use of the Army screen or Army method, and second, it is our firm belief that the whole attitude toward the problem of foreign body localization in the field is undergoing a transition away from the importance and urgency it possessed in the first World War. By that we mean in World War I the rapid localization and removal of foreign bodies was a *sine qua non* to the prevention and reduction of infection. Today with the sulfonamide drugs at the front line and aerial evacuation of wounded, the removal of foreign bodies can be and in many cases is a deferred—practically elective—procedure, with am-

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Captain E. Schweitzer, M.C., provided the drawings in figures 1, 2, and 8. Technician Third Grade Edgar D. Fisher and Technician Fifth Grade John B. Stone assisted in the experiments. Captain Lent C. Johnson, M.C., rendered assistance.

1. Buguet and Gascard: *Sur l'action des rayons X sur le diamant*, C. rend. Acad. sc., 30 March 1896, p. 457.

2. Shenton, E. W. H.: *A New Method of Rapid X-ray Localization*, Guy's Hosp. Gaz., Lond., 25 March 1916, XXX, p. 87.

3. Shenton, E. W. H.: *X-ray Localization of Foreign Bodies*, Brit. M. J., 1940, 1, p. 993.

ple opportunity for the making and studying of roentgenograms. In some theaters of operation the x-ray service may have (through certain supply problems and difficulties) only

the U. S. Army Field Unit, plenty of x-ray films and processing chemicals, but no field localization table (a separate item in the Medical Department Supply Catalog), in which case a rapid, accurate film method for depth determinations would be most helpful. That the prime requisite for any method chosen for use under the pressure of work in military x-ray installations is simplicity cannot be reasonably questioned. The method to be described satisfies this requirement admirably.

METHOD

As described by Shenton⁸ the method consists of using two films in cardboard holders mounted on each side of a box, that both films face the x-ray beam and overlie the part of the patient's body containing the foreign body whose depth is to be measured. One exposure is made; the x-ray tube is shifted any desired distance, (usually at least 6 cm.), and a second exposure is made. The films are processed and may be read wet or dry. Each film will have two views of the foreign body upon it and the distance between the images will be different on the two films accordingly as one is nearer and the other farther from the target of the x-ray tube (parallax). It is this difference that makes calculations of the depth possible (figure 1). The procedure is entirely independent of tube-film distance or amount of tube shift.

Calculations of the depth of the foreign body are made in either of two ways. (1) Graphically: A vertical line is drawn

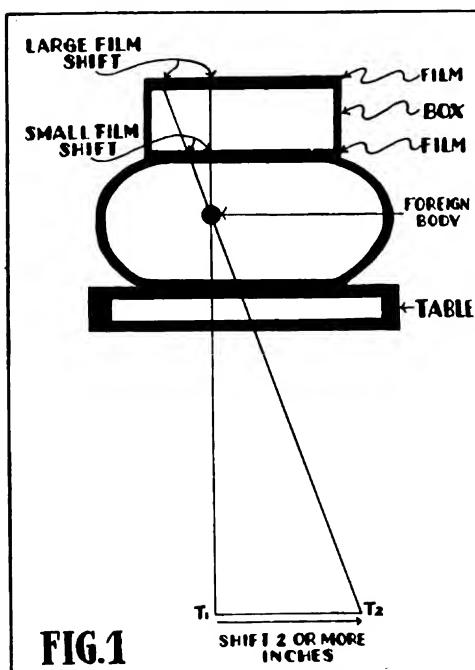


FIG.1

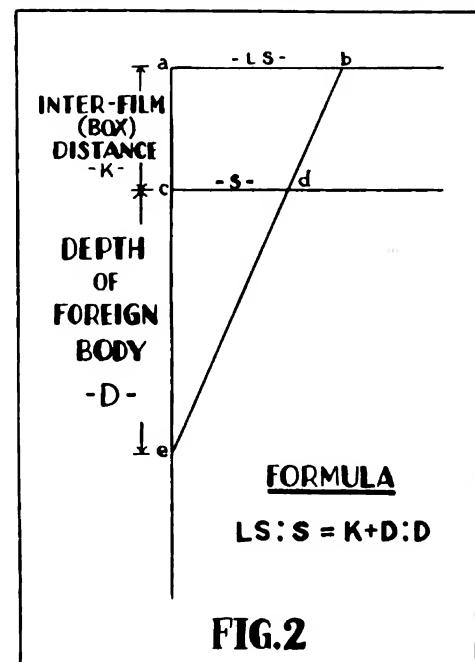


FIG.2

on paper. At the top of this line and perpendicular to it a horizontal line is drawn. Below this line and at exactly the same distance as separated the two films (i.e., box thickness) a second horizontal line perpendicular to the vertical line is drawn. Along the top line the distance of greatest image shift as measured by dividers (or transparent acetate rule) on the film is laid off (line *a-b*). On the lower line the measured distance between foreign body images on the film with short image shift is laid off (*c-d*). Points *b* and *d* are now connected by a line and the line projected until it intersects with the vertical line at *e*. The distance *c-e* measured on the paper is the depth of the foreign body. (2) By formula: From the similar triangles outlined in figure 2 (as just drawn by the graphic means of calculating the foreign body depth) it can be seen that—

Large image shift (LS) is to small image shift (s) as box thickness (K)
plus depth (D) is to depth (D)

$$LS: S :: K+D : D$$

For example: The large image shift measures on the film 1.25 cm.
The small image shift measures on the film 0.5 cm.
Box thickness (or K) measures 8.25 cm.

$$\begin{aligned} 1.25 : 0.5 &:: 8.25+D : D \\ 1.25D &= 4.125+0.5D \\ .75D &= 4.125 \\ D &= 4.125/0.75 \\ D &= 5.5 \text{ cm.} \end{aligned}$$

1. Wooden frame hinged to wooden upright.
2. 14" x 17" wooden frame with screws for leveling.
3. Ordinary C-clamp.
4. Two small line-levels.
5. Wooden box with cardboard film holders.
6. Ordinary part-thickness calipers.

In our experience the graphic method is quite satisfactory and accurate. It is convenient to have a good pair of draftsman's dividers or calipers which any roentgenologist will have in his department for Sweet eye localization work. This is not absolutely essential, however, as measurements with a transparent acetate rule are sufficiently accurate.

In Shenton's recent article³ the bare outline of the method is given and no information is given as to a means of holding the box plus films above the part to be radiographed or other considerations or details of actual procedure.

The simple pieces of apparatus illustrated in figure 3 which have been all that is required by us, can be obtained in any hospital carpenter-shop. They consist of:

1. A wooden frame hinged to a wooden upright for attachment to side of standard U. S. Army litter.
2. A 14" x 17" wooden frame covered with washed x-ray film base and having four ordinary screws—one at each corner of frame for leveling the frame after it is clamped to the litter.
3. Ordinary C-clamp to hold upright of frame to the litter.
4. Two small line-levels (obtainable from any hardware store) mounted one on lengthwise margin of frame and the other on crosswise margin to check exactness of leveling of frame over the part to be radiographed.
5. The wooden box with cardboard holders attached by means of washed film base envelopes and adhesive tape. The box has wooden sides and

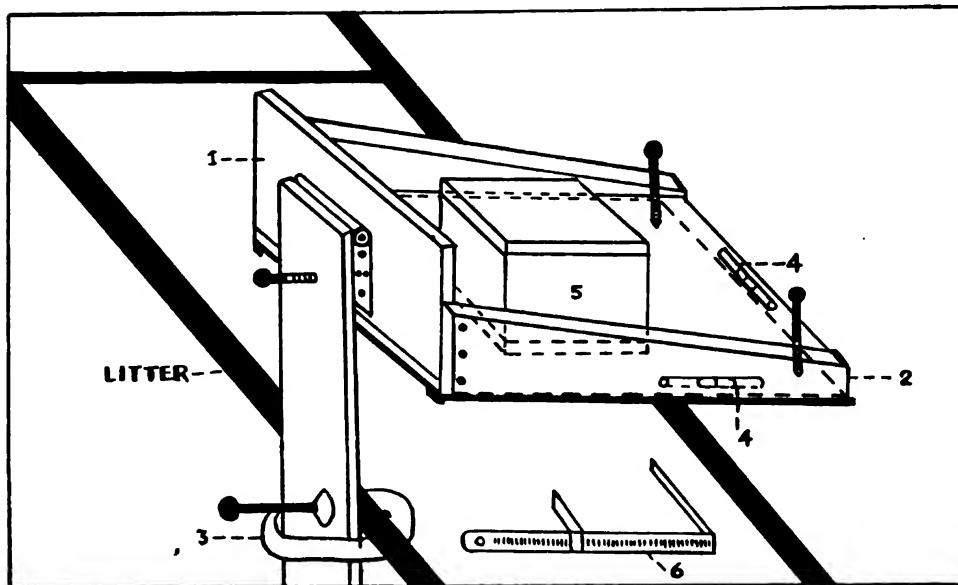


FIGURE 3

the two surfaces in contact with cardboard holders are masonite (checked fluoroscopically to be free of any radiopaque densities). A box thickness of 8.25 cm. was decided upon after trying various thicknesses of boxes and checking the results obtained on the phantom supplied with the U. S. Army Field Unit.

6. Ordinary part-thickness calipers for determining film-part distance. The film-part distance must be subtracted, of course, from the value found for $c-e$ in figure 2 whenever the box with attached films is not placed in direct contact with the anatomical part.

These parts assembled as they would be used with the Army litter and 30 Ma. U. S. Army Field Unit x-ray generating apparatus are shown in figure 4.

A step-by-step outline of the procedure in using the method follows:

1. Place the part in the selected position and with fluoroscopic screen (or by means of an intensifying screen from a cassette if no fluoro-

scope is available) mark the skin vertically above the foreign body. In marking the skin an opaque cross (cut from sheet lead) mounted atop the cone attached to the inverted tube of the Field Unit (below the stretcher) makes an excellent reference marker for accurate perpendicular alignment of the central ray through the foreign body.

2. The tube must be kept in this alignment for the first exposure. Change technique to radiography for the two exposures to be made.
3. Place the box carrying an 8" x 10" film on each surface over the foreign body and make two exposures, moving the tube 6 or more centimeters between them.
4. Process the films.
5. Measure the foreign body shadow shifts on the two films and apply them to the formula or plot them graphically as shown in figure 2. If, through irregularities or contour of the body surface (viz.,

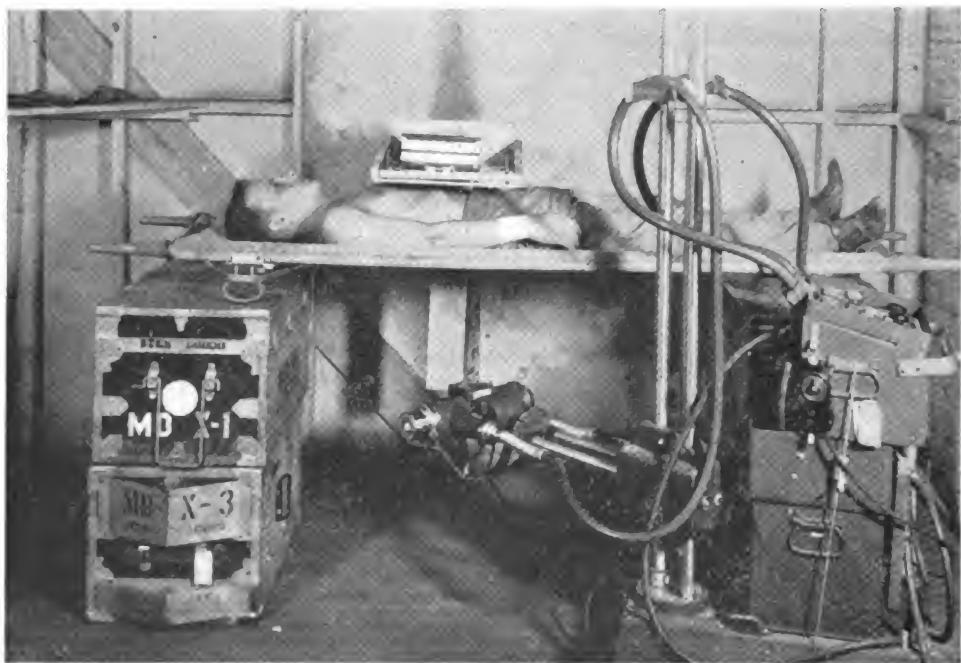


FIGURE 4

thorax, crest of ilium, pelvic region) the box cannot be placed directly upon the skin surface marked in step 1, the box placed on apparatus in figures 3 and 4 is placed directly over skin mark and the film-part distance read by calipers is subtracted in the calculation as noted previously.

DISCUSSION

With the apparatus set up as in figure 4, the method has been tried on phantoms, cadavers, and surgical patients.

Phantoms: The Shenton method, using a box thickness of 8.25 cm. and tube shift of not less than 6 cm., gave accurate results in checking the depth of the lead numbers on the depth phantom furnished with the table unit of the Army Field Unit.

Cadaver experiments: While it is true that the living body cannot be treated as a motionless symmetrical solid in the matter of radiographic localization, we feel that one of the best checks on any localization method should be localizing imbedded foreign bodies placed in cadavers at autopsy. Even here absolute precision is not possible and there is rather uniform agreement that, in general body work, an error of 0.5 cm. is permissible. Likewise, if allowance is made, as it certainly must be, for the disturbance of tissues and anatomical structures produced by the surgeon's exploration and manipulations, an error of 0.5 to 1.0 cm. in the depth localization is certainly permissible.

TABLE I

Location of foreign body	Dial method	Shenton	Autopsy measurements
1. In upper abdomen	6.2 cm.	6.5 cm.	7.0 cm.
2. In lower pelvis	14.0 cm.	14.2 cm.	13.8 cm.
3. In thorax	7.6 cm.	6.0 cm.	6.5 cm.

Table I shows results of localizing a buried 0.45 caliber bullet in different structures at autopsy. The U. S. Army "lightweight" field unit (Medical Supply Catalog No. 9621500) was set up in the morgue with the cadaver on a standard U. S. Army litter. The dial localization method of this field unit was performed; the Shenton roentgenographic method (figures 3 and 4) was used and the pathologist checked both results by inserting a needle in the direct vertical path over the foreign body from the skin marking made at fluoroscopy.

The satisfactory agreement of the results obtained by the two roentgen ray methods is clearly shown in table I. Likewise, the close agreement between the roentgen ray depth determinations and the pathologist's measurements is apparent.

Surgical patients: These observations were made by localizing various foreign bodies present in several patients at Billings General Hospital recently returned from duty overseas. Practically all these localizations were made to check the Shenton method with the U. S. Army Field Unit method. The results of both methods are shown in table II. The cases furnished excellent practice material for becoming familiar with the method here being reported. We were especially anxious to have these results checked by the surgeons at operation but in most cases the patients were not in need of having the foreign body removed or even explored, the patients having been hospitalized for the repair and regeneration of peripheral nerve injuries, and for bone and orthopedic conditions. One opportunity for surgical removal of pieces of shrapnel did present itself, however, and permitted the surgeon to check our measurements.

TABLE II

Foreign body	U.S. Army Field Unit	Shenton method
1. 0.38 cal. bullet in left shoulder	7.6 cm.	7.3 cm.
2. Metallic f.b. left femur	7.5 cm.	7.5 cm.
3. Metallic f.b. right tibia	3.7 cm.	4.4 cm.
4. 0.30 cal. bullet left shoulder	3.7 cm.	3.7 cm.

Pvt. —, 23-year-old white soldier admitted to Billings General Hospital on formal transfer from Halloran General Hospital, Staten Island, N.Y., with chief complaint of partial paralysis of right radial nerve and pain in right foot and right hip. On 20 February 1943 in action against the enemy near Kasserine Pass, Tunisia, patient was injured when an aerial bomb exploded nearby. He was not rendered unconscious but received multiple shrapnel wounds in right upper arm and left arm, and right foot and right hip. On admission to Billings General Hospital all shrapnel wounds had healed nicely and the radial nerve injury was responding satisfactorily to a nerve repair performed in a general hospital somewhere in England. The only surgery required on this patient at Billings General Hospital was removal of a rather large piece of shrapnel in the right thigh. This was causing considerable discomfort ("pinching") to the patient while walking.

This was an excellent case for checking the Shenton method at operation by the surgeon. Localization was done with the Shenton method as here described and the surgeon's measurement was obtained by passing a needle along the vertical path below the skin marking made at fluoroscopy and measuring with a rule the length of needle needed to reach the foreign body. The results are as follows:

Location of foreign body	Shenton	Surgeon's data
2.7 cm. x 1.1 cm. shrapnel overlying the greater trochanter	4.2 cm.	3.5 cm.

CONCLUSIONS

An additional advantage of this method is that it accurately reveals the relative position of the foreign body in reference to a bony landmark. That is, being a double-exposure method, the films are capable of immediately placing the foreign body anterior or posterior to a bony landmark, and thereby facilitate the surgical approach. Either one of the two processed films in the Shenton method will reveal whether there is a greater shift between metallic foreign body shadows

or the shift of any bony shadows present in the area being radiographed. All our films are made with the x-ray tube beneath the stretcher (figure 4) and, if the metallic foreign body shadows have a greater image shift than do the bony shadows, the foreign body is behind or posterior to the bony structure (by parallax because nearer to the x-ray tube). Should the shift of the bone images be more than the foreign body spacing, the foreign body would, of course, lie anterior to or above the bony landmark.

In teaching roentgenographic technicians at Medical Department enlisted technicians' schools this method should be presented. It will provide the enlisted technician with a reliable film method to be used in conjunction with or auxiliary to the U. S. Army field fluoroscopic method.

Reactions to Typhus Vaccine

CAPTAIN VERNON E. ROTH
Medical Corps, Army of the United States

Because of the large-scale use of typhus vaccine by the armed forces of this country, an investigation of reactions following administration of this vaccine was undertaken. Accordingly, the record of thirty-two typhus vaccine reaction admissions to this hospital were reviewed. During the same period of time, there were ten admissions for typhoid vaccine reaction, five for smallpox vaccination reaction, and three for vaccination reaction of undetermined type.¹ Twenty-three of the thirty-two cases of typhus vaccine reaction were the usual constitutional vaccine reactions. The average case had moderate fever, chills, malaise, normal eosinophil count, delayed onset of symptoms, and no personal or family history of allergy. The other nine cases had allergic reactions to injections of typhus vaccine. This type of reaction is of importance because of the possibility of anaphylactic shock. The clinical picture was that seen in other allergic diseases. Some patients had gastro-intestinal symptoms, some urticaria, some asthma, and some had mixed reactions. The allergic reactions are characterized by lack of fever, immediate and explosive onset, signs of allergic disease, eosinophilia, and previous personal and family history of allergy. There were no deaths in

1. Several severe reactions have been reported to The Surgeon General's Office. The number of reactions known to have occurred is negligible in comparison with the number of doses of egg vaccine administered; now in the millions. Nevertheless, medical officers should be alert to the possibility of egg sensitivity in persons given typhus vaccine, yellow fever vaccine, or other prophylactic biologicals derived from eggs. If individuals suspected of being egg-sensitive are given skin tests to confirm the diagnosis, egg vaccine material should be diluted 1,000-fold and intradermal skin tests done by the injection of as small an amount as possible. If this test is negative, it may be repeated with a 1:100 dilution and should this be negative, with a 1:10 dilution. Undiluted vaccine may produce nonspecific irritative skin reactions. Desensitization is not recommended.—Ed.

this series. It was impossible to follow the patients subsequent to discharge from the hospital, but the allergic reactors were classified as not fit for overseas duty.

CASE REPORT

A typical example of an allergic reaction to typhus vaccine was that of a soldier, aged 19, admitted on 26 November 1943, in anaphylactic shock. The history revealed he had attacks of asthma from the age of six, persisting until the age of eleven. Since then he had no asthma until now. Immediately after the first injection of typhus vaccine he had extreme dyspnea, cough, weakness, and substernal pressure. His temperature was 97.4, pulse 128 and weak, respiration 24, skin cyanotic and covered with urticarial eruption, face edematous, lungs filled with asthmatic rales, and extremities cold. He recovered entirely in four days.

Three days after discharge he was given a reduced dose of 0.1 cc. of typhus vaccine. Immediately he began to have a severe asthmatic attack and was readmitted. He did not have the shock and cyanosis seen before. Examination revealed asthmatic rales, temperature 98.6, pulse 120, respiration 36. He recovered in thirty-six hours.

In a personal interview with Dr. Herald R. Cox, who originated the Cox method of producing typhus vaccine, Dr. Cox stated that these reactions probably resulted from the residual egg antigen and not from the Rickettsia. There have been recent changes in methods of producing this vaccine but they cannot be published now. Dr. Cox stated that the vaccine still contained residual egg antigen, although lesser amounts than formerly, but if experience with reactions required it, he felt that more of the antigenic material could be extracted.

The first group of constitutional reactions can best be explained on the basis of foreign protein reactions. The second group of allergic reactions can only be explained on the basis of an allergy to some constituent in the vaccine, which is probably the residual egg protein, possibly albumin. Tuft's "Clinical Allergy" states there is practically no antigenicity in egg yolk.² Four of the allergic reactors gave a definite history of allergy to ingestion of eggs, and an additional three gave a history of other allergies.

Clinically, it is important to know that severe allergic reactions and anaphylactic shock occasionally occur following the administration of typhus vaccine. The incidence of reactions to typhus vaccine injections in relation to total number given is very low. However, if the vaccine were given to civilians, the incidence probably would be higher because of a greater percentage of allergic individuals than in the Army. Most of these reactions can be avoided by questioning about

². This is not in accord with more recent unpublished observations made in the Division of Virus and Rickettsial Diseases, Army Medical Center. These observations have shown that egg yolk is antigenic and that sensitization to egg yolk occurs.—Ed.

allergic diseases, including egg allergy, and, if the history is positive, by sensitivity testing. If skin tests are positive, desensitization may be attempted.

SUMMARY

Two types of reactions occur following injections of typhus vaccine. These types are constitutional or allergic. Four of nine allergic reactors gave a definite history of egg allergy. All available evidence indicates that allergic reactions are caused by some residual egg allergen in the vaccine. Precautions should be taken to avoid serious and possibly fatal reactions. Precautions should be the same as those taken before injecting horse serum products.

Technique for Staining Malaria Smears

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and

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A simple and rapid method for staining malarial parasites in thick blood films was reported by Field in 1941^{1,2} and the technique was again described by Wartman in 1943.³ This method is extensively used in Australia, Malaya, and the Middle East but appears to be little known in the United States.

Two solutions, one containing methylene blue and azure and the other aqueous eosin, both in phosphate buffer at pH 6.6, are used. The necessary materials are usually available in any medical laboratory. The results with this stain were found to be superior to those using Wright or Giemsa stains.

The stains are prepared as follows:

Solution A:	Methylene blue	0.8 gm.
	Azure 1	0.5 gm.
	Na ₂ PO ₄ (anhydrous)	5.0 gm.
	KH ₂ PO ₄ (anhydrous)	6.25 gm.
	Distilled water	500.00 cc.
Solution B:	Yellow water soluble eosin	1.0 gm.
	Na ₂ HPO ₄ (anhydrous)	5.0 gm.
	KH ₂ PO ₄ (anhydrous)	6.25 gm.
	Distilled water	500.00 cc.

1. Field, J. W.: Morphology of Malarial Parasites in Thick Blood Films; Identification of Species and Phase, Tr. R. Soc. Trop. M. Hyg., Lond., 34:405, 1941.

2. Field, J. W.: Further Note on Method of Staining Parasites in Thick Blood Films, Tr. R. Soc. Trop. M. Hyg., Lond., 35:35, 1941.

3. Wartman, William B.: Notes on Field's Method of Staining Parasites in Thick Blood Films, Army M. Bull., No. 68, pp. 173-177, July 1943.

Since azure is not a standard dye in Army laboratories, it was prepared as suggested by Wartman; that is, 1.3 gm. of medicinal methylene blue and 5.0 gm. anhydrous Na_2HPO_4 were dissolved in 50 cc. of distilled water and heated for thirty minutes in a boiling water bath. After the solution was cooled, a solution of 6.25 gm. of KH_2PO_4 in 500 cc. of distilled water was added, set aside for twenty-four hours, and filtered.

In our experience immersion of the thick smear for one second in solution A and two seconds in solution B gave the best results. Washing the smear after immersion in solution A and solution B is important but should be done carefully in order not to wash out the stain.

The parasites stain clearly and are easily identified. However, the diagnosis of the type of malaria can seldom be made from a thick film preparation, and for that purpose, a thin film must be employed. Although the Wright stain gives satisfactory results, there are several disadvantages to this method. First, with every new preparation of this stain the technique for staining must be modified. Second, much of the stain is used up and is lost during staining. Third, a dark deposit often remains on the slide, making a study of the slide difficult for the inexperienced technician; finally, the staining of a slide requires from five to ten minutes.

We attempted to eliminate these disadvantages in staining thin smears by adopting Field's method for staining thin as well as thick smears. It was found that when smears are thoroughly dried in air and immersed in methyl alcohol for two minutes, the red blood cells are fixed without impairing the staining of malarial parasites, and that the alcohol so affects the platelets that they fail to stain, thus eliminating the possibility of confusing platelets with the parasites.

The immersion of the thin smear for two seconds in solution A and half a second in solution B gives a clean and clear film, in which the red blood cells are stained a bright pink with the distinct intracellular parasites a vivid blue. Thorough washing of the slides in distilled water between the immersions in the two solutions is essential. The parasites can be observed not only in the very thin portions of the smear but even in the thicker parts. The trophozoites, schizonts, and gametocytes stain characteristically and present the same aspect obtainable with Wright's stain. The advantages of Field's method are that the staining solutions do not deteriorate on standing. Practically no stain is lost during staining. The method lends itself to the mass staining of thin smears.

Apparatus and Clinical Notes

INSECT CONTROL IN AMPHIBIOUS OPERATIONS

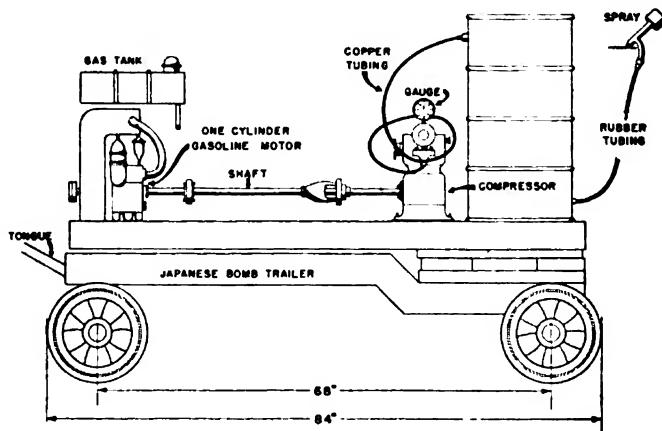
CAPTAIN GEORGE N. JOHNSON
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In amphibious operations on islands of the central Pacific, insect control is of paramount importance the instant the assault troops stream ashore and ever thereafter. In the Anguar and Peleliu invasions, flies, mosquitoes, gnats, and ants were ever present, and within a few days the flies and the diarrhea and dysenteries they carry became a real threat. Spraying the islands with DDT solution by low-flying planes, general sanitation measures, and the use of small hand-operated oil sprayers produced fair results; but the flies and their related diseases were still present. While spraying by planes was a great aid, the small hand sprayer is very ineffective in covering all the areas breeding flies and other insects.

After taking into account these facts, work was immediately started on a small power-driven sprayer that could be mounted on a trailer and in which DDT solution or Diesel oil could be used as the insecticidal and larvicidal agent.

Warrant Officer H. Hyder, motor officer of our battalion, and the enlisted men of our motor pool began to assemble the parts, and the end result was a power-driven insecticide sprayer, mounted on a trailer which could be pulled by a jeep and throw a spray of either DDT solution or Diesel oil for 22 feet. With 50 feet of small rubber hose extending from the barrel to the sprayer nozzle, an area of almost 75 feet in diameter can be sprayed without moving the spraying apparatus proper. An area of 66,000 square yards can be sprayed thoroughly in four hours, whereas in comparison to spraying the same-sized area with two hand-operated sprayers it takes sixteen hours. After using the device for several days, the area mentioned was almost completely free of insects. Within ten days, diarrhea cases for our battalion dropped from sixty per day to nine per day. Other battalions in this vicinity have taken to building a similar apparatus. In future operations the sprayer will be brought ashore with the vehicles and it will then be in full use a week at the latest after D-day.

The unit consists of an ordinary 55-gallon steel oil drum, mounted vertically on a frame to which air is fed from a compressor, which in turn is driven by a small engine taken from a water purification pumping unit.



A spray-head nozzle and valve were taken from a Hudson 3-gallon portable decontaminator unit. After experimenting with the jets, it was found that the jet from a one-quart pyrene fire extinguisher inserted into one of the openings of the spray head proper produced the desired effect. The rubber spray hose is attached to the nozzle head on one end and to the drum on the other by iron nipples welded into the drum. The hose is 50 feet long. The entry for the air is near the top of the drum on the opposite side from the outlet. The compressor is a two-cylinder, water-cooled unit salvaged from a wrecked "duck," and inasmuch as the unit is operated only for short periods the water-cooling system was not hooked up. The automatic record valve is set for 30 pounds' air pressure and a pressure gage was installed in the line between the tank and the compressor to indicate visually the pressure. The connections between the compressor and the drum were made of 5/16-inch copper tubing with loops bent into it for vibration dampeners and were fitted with S.A.E.¹ fittings at drum and compressor. The propeller shaft between the engine and compressor is the same shaft that was attached to the compressor in the "duck" with the exception that on the engine end of the shaft a piece of bar stock was bored and tapped with a one-inch S.A.E. thread on the end of which was welded a spider, which in turn was attached to a thermoid coupling on the end of the shaft. The machining of this piece was accomplished in such a manner that no machine work was necessary on the engine itself, leaving it free to be detached and returned to its original unit if need be. The engine is a Wisconsin, one-cylinder, four-cycle, 2 1/2- by 2 3/4-inch bore and stroke. It is air cooled and powered by a small magneto, and has a one-gallon gasoline tank mounted on top. Starting is accomplished by a rope and pulley.

The whole unit is mounted on a four-wheeled Jap bomb carrier frame, with the axles turned upside down to give added clearance from the ground. The tongue has a piece of 5/8-inch rod iron welded to its end to form a ring for towing purposes. A piece of 3-by-12-inch planking as long as the carrier and bolted to the frame by standard bolts serves as a base for the complete unit.

RADIOGRAPHIC DEMONSTRATION OF THE ZYGOMATIC ARCH

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Maxillofacial surgery in this war has received greater attention than ever before and there has been increasing emphasis on early restoration of the injured part to prevent permanent disfigurement. The demands, therefore, for more informative radiographic demonstration of various portions of the facial bones have run apace. The zygomatic bone is vulnerable to fracture. In order that the maxillofacial surgeon may determine the extent of the damage and the position of the fragments, special x-ray techniques have been developed.

Cephalocaudal View

The patient is placed on the table in the supine position with the shoulders elevated by a folded pillow. The top of the patient's head rests

The item beginning on this page does not appear in the index for this issue because it was inserted after the index had been printed.

1. Society Automotive Engineers.

on the table top and the preliminary positioning is similar to that used for the cephalocaudal, or Bowen-Hirtz's, position. The head is then rotated on its infero-superior axis about 10 degrees toward the affected side, and the chin is tilted 10 degrees to the same side. The tube is tilted directing the central ray so that it is perpendicular to and bisects a line between the outer canthus of the eye and the external auditory meatus (Reed's base line). The film is centered to the central ray. Bucky technique is preferable.

The x-ray examination made in this manner shows the arch in profile. Lateral or medial displacement of the fragments can be demonstrated on this film (figure 1). It has become important to determine in fractures of the zygomatic arch whether or not there exists superior or inferior displacement of the fragments so that the surgeon may be able to correct such malposition as well. With this in mind, a lateral view of the zygomatic arch has been devised.

Lateral View of Zygomatic Arch

The patient lies supine on the table, and the head is rotated to the affected side as far as the mobility of the neck will allow. The chin is elevated. The tube is tilted 27 degrees toward the head. The film is centered to the lip line and the central ray is directed to the center of the film. Bucky technique is recommended.



FIGURE 1. Cephalocaudal view of the zygomatic arch.



FIGURE 2. Lateral view of zygomatic arch. This projection is also satisfactory for demonstration of the ramus and condyle of the inferior maxilla.

On examination of the film made using the above method, the zygomatic arch can be seen in its entirety, crossing the condyle of the inferior maxilla and running parallel with the superior surface of the inferior maxilla, having the tip of the coronoid process superimposed on the junction of the arch with the malar portion of the zygoma (figure 2).

Conclusion

Two views are described for the radiographic demonstration of the zygomatic arch, together with the methods of obtaining these examinations. With this study the displacement of fragments can be determined in two planes, such as is expected in examination of other portions of the skeleton.

SPINAL CORD CHANGES IN AVITAMINOSIS

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and

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Report of Case,

A prisoner of war, aged 31, was admitted to a station hospital, on 1 November 1943, with extreme weakness and inability to stand or walk, of ten days' duration. From September 1941 to July 1943 his diet had consisted of black bread, black macaroni with cheese and tomato sauce, coffee without milk or cream, an occasional vegetable, and beef soup which he rarely consumed. He subsisted on this diet in Yugoslavia for twenty months. In Sicily for four months he received oranges and lemons daily along with other food except vegetables. He had no meat, eggs, milk, or butter for twenty-two months. On arrival at the prisoner of war camp in September 1943 he was unable to eat the entire diet, and yet he considered himself in good health, except for weakness at first in both legs, then about ten days later in his hands and arms. Walking became very difficult and brought on severe fatigue. In October he had numbness and tingling of the feet, knees, and hands, and difficulty in swallowing. Liquids would go up into his nose. His voice became deeper in quality and he talked more slowly. In another week, he had to cease all work: by 20 October he was unable to stand. His family history was noncontributory. He had measles in childhood and an occasional "cold," denied venereal diseases, and said he had never had malaria.

Examination

He was pale, mildly emaciated, but not confused or dehydrated. He answered questions intelligently in his native tongue. The tonsils were small and the mouth was clean. The blood pressure was 94/66 mm. of mercury. The abdomen was soft, no masses were felt, and the liver and spleen were not palpable.

The upper deep tendon reflexes were diminished, the lower deep tendon reflexes (K.J. and A.J.) were absent, even on reinforcement, upper abdominal reflexes were diminished, lower abdominal reflexes were absent, and the cremasteric reflexes were absent.

Position and vibratory sense of both lower extremities up to and including the iliac bones was absent. These nodalities were present in both upper extremities. Ataxia in both upper extremities was noted by the finger-to-nose and finger-to-finger tests. Ataxia in the lower extremities was so marked that he fell at every attempt to stand. The heel-to-knee test revealed marked ataxia. Light touch perception was undisturbed. There was a positive right Babinski and right confirmatory dorsal toe sign by Oppenheim's method. Athetoid movements were noted in the fingers of both hands.

His blood on admission contained 3,560,000 erythrocytes per cu. mm., 10,500 leukocytes of which 56 percent were polymorphonuclear neutrophils, 41 percent lymphocytes, and 3 percent monocytes; hemoglobin, 75 percent Tallqvist. The icterus index was 6. The urine was yellow in color, acid, specific gravity 1.022. The chemical and microscopic examinations were negative. The blood sugar, fasting, was 100 mg. per 100 cc. The blood smear for malarial parasites, the blood Kahn reaction, and the stools for ova and parasites were negative. The cerebrospinal fluid contained two lymphocytes per cu. mm. and 140 mg. of protein per 100 cc.; the spinal fluid sugar was 67 mg. per 100 cc., and the Wassermann negative. There was a heavy increase of spinal fluid globulin. The manometric response to jugular compression was normal. Gastric analysis done with 7 percent alcohol

showed a total acidity from 42 to 68 and free hydrochloric acid from 22 to 53. A diagnosis of posterolateral sclerosis due to avitaminosis was made.

Treatment

The patient was fed a high-caloric, high-vitamin diet. He was unable to feed himself. Thiamin chloride, 60 mg., was given hypodermically daily for fifty days and 2 cc. of Lilly's liver extract intramuscularly three times a week for fifty days; massage daily to legs and arms, together with passive and, later, active exercises. Sixteen days after admission motor power began to improve rapidly in arms and legs. Re-educational walking exercises were instituted twenty-nine days after admission and discontinued 3 January 1944, at which time muscular power was normal in all extremities. The total protein in the cerebrospinal fluid had reduced to 40 mg. On 18 January he was able to take care of all his needs, and was well oriented, and was able to walk without any ataxia with his eyes open and closed. Vibratory and position sense had completely returned in the upper extremities and partially in the lower extremities. A dulled vibratory perception was noted in three isolated patches, one, a circumscribed patch over the right infrascapular area, a second, a vertical patch over the first and second thoracic dorsal vertebral spines, and the third, a long, narrow continuous patch from the sixth thoracic vertebral spinous process to the fifth lumbar vertebral spinous process. The Babinski and Oppenheim toe responses had disappeared. The patellar reflex was present with a diminished response bilaterally and was increased by Jendrassik reinforcement. The Achilles' tendon reflex remained completely absent even with reinforcement. He had no complaints or subjective symptoms, was anxious to leave the hospital, and was returned to the internment camp on 21 February 1944.

Comments

A long period of vitamin-deficient diet is required to produce demonstrable clinical and neurological changes. Our patient had a deficient diet for two years before he developed his first subjective complaint.

Multiplicity of vitamin deficiency is frequent. Hsu¹ feels that three factors aid in producing vitamin deficiency: (1) inadequate intake of the essential vitamins; (2) faulty absorption or an excessive loss of the essential vitamins as a result of the altered gastro-intestinal tract function; and (3) increased somatic demand from some interference with storage or some failure of utilization by the tissue cells.

In our case inadequate intake produced the deficiency symptoms. There were inadequate intake of all vitamins for two years, with the possible exception of vitamin C. This was aggravated on arrival in this country even though adequate diet was available, because loss of appetite and mild gastro-intestinal symptoms prevented his ingesting the completely adequate diet.

Neuropathologic changes resulting from avitaminosis are diffuse, resulting in involvement of the Betz cells in the cerebrum and occasionally the neurons in the basal ganglia and brain stem (Wernicke's syndrome). The peripheral (beriberi) nerves and anterior and anterolateral horn cells in the spinal cord are often affected. The dorsal root ganglion neurons may be involved primarily, and the sensory columns in the spinal cord involved both primarily and secondarily as well as occasionally the motor columns of the spinal cord. Our case had transient pseudobulbar changes as revealed by the changed voice, thick speech, and difficulty in swallowing, which symptoms suggest some basal ganglia and possibly cerebellar involvement. The suggestion is strengthened by the athetosis of the fingers. The predominant findings, however, were referable to the posterior ascending columns and lateral motor column of the spinal cord. The right Babinski and confirmatory signs indicate involvement of the corticospinal tracts.

1. Hsu, Ying-K'uei: Pathologic Anatomy of Human Nervous System in Avitaminosis, *Arch. Neur. Psychiat.*, Chic., 48:271, Aug. 1942.

The presence of upper abdominal reflexes and absence of lower abdominal reflexes along with absence of pyramidal tract involvement in the upper extremities locate the involvement of the right corticospinal tract from the tenth thoracic spinal segment caudally. Ataxia and loss of position and vibratory sense in both lower extremities indicate prominent degeneration of both fasciculus gracilis tracts. Ataxia of the upper extremities indicates a lessened degree of involvement of the fasciculus cuneatus tracts. These findings are consistent with the neuropathologic and experimental changes as reported by others.

A provocative finding not noted in the literature was the increase of total protein and globulin in the cerebrospinal fluid at the height of the illness and their reduction with subsidence of neurological signs.

A diagnosis of pernicious anemia was ruled out because of the absence of macrocytic anemia, achlorhydria, sore tongue, and hemolysis. Achlorhydria occurs in at least 97.6 percent of cases and in some instances precedes by many years the development of pernicious anemia.² The chance of a patient with adequate gastric acidity having pernicious anemia would be exceedingly rare. The blood smears did not reveal any large or oval-shaped erythrocytes and no diffuse or punctate basophilia. There was no evidence of red cell hemolysis.

Tabes dorsalis was not sustained because of the absence of serological and other neurological and etiological concomitants.

Multiple sclerosis is not probable because of the absence of previous episodes, the normal eyegrounds, and the presence of bilateral, symmetrical cord lesions with a predominance of dorsal column involvement. In multiple sclerosis pyramidal tract signs predominate.

The history, clinical neurological findings, and response to definitive therapy lead to the conclusion that our patient suffered a profound neural damage from multiple vitamin deficiency.

Summary

A review of literature³ on neuropathologic changes resulting from avitaminosis reveals a more frequent degeneration of the spinal cord posterior columns and less often of the lateral columns than was generally accepted.

A case of clinical posterolateral sclerosis due to multiple vitamin deficiency was successfully treated with liver extract, thiamin chloride, and adequate diet.

SALMONELLA FOOD POISONING

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and
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This report concerns an outbreak of food poisoning in which 220 men were affected. An investigation was begun immediately. Samples were taken of all food served during the day. Each man affected was questioned and a chart was prepared showing all food eaten during the preceding twenty-four hours. All food handlers denied having been ill prior to the epidemic or at the time of the outbreak.

The incubation period was about seven hours, followed by an abrupt onset of nausea, vomiting, abdominal cramps, and finally diarrhea, usually with four to eight liquid stools. All symptoms except abdominal

2. William, J. F.: Gastric Secretion in Pernicious Anemia, *Q. J. Med.*, Oxf., 1:361, 1932.

3. Because of lack of space, sixteen references to the literature have been omitted.

tenderness subsided within twenty-four hours. Seven cases required hospitalization but all returned to duty within forty-eight hours. The onset was very abrupt; within thirty minutes 73 men had entered the infirmary and the last case reported about four hours later.

It became apparent that veal salad was the source of this outbreak. The veal, obtained a day prior to use, was stored in a refrigerator at a temperature of about 5°C. It was cut up, placed in large vats, and boiled (it is not known how long). The meat was then ground and mixed with the usual salad materials. No uncooked veal was available for examination.

Two hours following the onset of symptoms, the following foods were received at the laboratory: stewed tomatoes, cold cuts, veal salad, boiled potatoes, olives, beets, and bread pudding.

A gram of each food was transferred to a glass jar containing 99 cc. of sterile tap water and sterile glass beads. Each jar was shaken in a Kahn shaker for fifteen minutes and the following media were inoculated from each sample: melted and partially cooled blood agar deeps, nutrient agar deeps, and desoxycholate agar deeps were inoculated with 1 cc. each; then pour plates were prepared. Two eosin-methylene blue and two SS agar plates were streaked. Thioglycolate broth was inoculated.

All the foods were essentially negative except the veal salad, which showed a plate count of 1,200,000,000 bacteria per gram; the desoxycholate plate showed 150,000 *Escherichia coli* per gram; staphylococci and *Clostridium* were not present; *Salmonella sp.* (Oranienburg type) was present on both the eosin-methylene blue and SS agar plates.

Salmonella sp. (Oranienburg type) (VI, VII; mt) is a gram-negative, motile rod which produces acid and gas from dextrose, maltose, mannite, xylose, and arabinose; acid from tartrate, positive H₂S; negative sucrose, lactose, inosite, and indole. This organism was first considered to be *Salmonella enteritidis*, as the cultural reactions are identical. It was sent to the National Salmonella Center,¹ University of Kentucky, which reported its true identity.

Salmonella sp. (Oranienburg type) (VI, VII; mt) is culturally identical with *Salmonella enteritidis* (IX, XII; gom), but differs in both the O and H antigens.

Vomitus was collected from six individuals and cultured as described above. *Salmonella sp.* (Oranienburg type) was isolated from one of the samples. Rectal swabs received from seven individuals with diarrhea placed in selinite-F broth and incubated at 37°C. for about eighteen hours. Then two desoxycholate and two SS agar plates were streaked from each broth. *Salmonella sp.* (Oranienburg type) was isolated from two individuals. There was no duplication between vomitus and stools.

A total of 64 employees, mostly civilians, were examined physically; then, with the aid of sterile finger cots, a rectal examination was done. The finger cots were wiped off with sterile, moist swabs, which were placed in selinite-F broth. The broths were incubated eighteen hours at 37°C. and then streaked onto desoxycholate and SS media. Three were positive for *Salmonella sp.* (Oranienburg type). One employee who continued to have positive cultures for six weeks was then given a course of sulfaguanidine, a total of 80 grams in ten days. Following treatment, three successive cultures were negative.

Agglutination tests were done on the thirty individuals with positive

1. This culture should have been sent to the Army Medical School, in accordance with AR 40-310, par. 2b(7). This procedure has now been revised by Change 1, AR 40-310, dated 3 July 1944, to require transmission of such cultures to service command laboratories when isolated at general hospitals.

cultures. The antigen was a formalized suspension of *Salmonella* sp. (Oranienburg type). All agglutination tests were negative.

Conclusions

1. *Salmonella* sp. (Oranienburg type) was the cause of food poisoning in 220 individuals.
2. The source of the outbreak was veal salad, but it was not determined how the veal salad was contaminated.
3. Sterile finger cots can readily be used to collect specimens for the examination of food handlers or for carrier surveys.
4. Carriers of *Salmonella* sp. (Oranienburg type) can be successfully treated with sulfaguanidine.

THE IMPORTANCE OF MICROSCOPY IN URINALYSIS

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An increasing number of specimens of urine with abnormal constituents reach the laboratory from persons with no renal complaints or with complaints not usually accompanied by renal disturbances. In many cases a request is made for a microscopic examination only "if the albumin test is positive." A test for albumin is not believed to be sufficient to rule out urinary tract disease. Slight traces of albumin, which might be overlooked in routine work, may be present in late stage glomerulonephritis, amyloid kidney, chronic pyelitis, active hyperemia, and passive congestion. It is erroneous, therefore, to assume that no urinary tract pathology exists on the basis of a negative report for albumin. More knowledge can be gleaned from a microscopic examination than from any other procedure in urinalysis.

In routine microscopy, one may see casts or blood cells even though the routine albumin test was negative. In many cases a recheck, using either the heat and acetic acid or Purdy's method, will show albumin present in amounts up to and greater than 15 mg. percent where less sensitive methods failed to show any present.

The necessity for centrifugation of urine specimens cannot be over-emphasized. In urine which has not been centrifuged, the lighter elements such as casts and epithelial cells will float near the surface for some time while crystals and pus cells will settle to the bottom. It is, therefore, essential that a sediment be obtained by centrifugation of a thoroughly mixed specimen. It is also important to examine the urine as soon as possible after it has been voided.

Microscopic study of urines will occasionally lead to a diagnosis unsuspected by the physician because of the absence of clinical symptoms. Such study may show patches of epithelial cells dislodged from a small papiloma of the bladder, or granular-appearing cells from the upper urinary tract and red blood cells due to renal irritation by the sulfonamides. Atypical cells indicating the presence of a tumor in the urinary tract may be encountered. Crystals, red blood cells, and ureteral epithelia may indicate lithiasis. Irritation of the kidney due to arsenic or mercury may be accompanied by a shower of distorted, granular-appearing epithelial cells from the renal tubules. Large numbers of pus cells with lymphocytes predominating may suggest further examination for the tubercle bacillus, especially if the absence of bacteria is noted. Such abnormal findings, and possibly others, though not absolutely diagnostic, may serve to direct the attention of the physician to the pathologic condition present.